

**Rationale for
Sampling and
Interpretation
of Ecological
Data in the
Assessment of
Freshwater Ecosystems**

BILLY G. ISOM editor



STP 894

RATIONALE FOR SAMPLING AND INTERPRETATION OF ECOLOGICAL DATA IN THE ASSESSMENT OF FRESHWATER ECOSYSTEMS

A symposium
sponsored by
ASTM Committee D-19
on Water
Philadelphia, PA, 31 Oct.–1 Nov. 1983

ASTM SPECIAL TECHNICAL PUBLICATION 894
Billy G. Isom, Tennessee Valley Authority,
editor

ASTM Publication Code Number (PCN)
04-894000-16



1916 Race Street, Philadelphia, PA 19103

Library of Congress Cataloging in Publication Data

Rationale for sampling and interpretation of ecological data in the assessment of freshwater ecosystems.

(ASTM special technical publication; 894)

“ASTM publication code number (PCN) 04-894000-16.”

Includes bibliographies and indexes.

1. Water quality bioassay—Congresses. 2. Environmental impact analysis—Congresses. 3. Freshwater ecology—Congresses. I. Isom, B. G. (Billy G.) II. American Society for Testing and Materials. Committee D-19 on Water. III. Series.

QH96.8.B5R38 1986 363.7'39464 86-3323

ISBN 0-8031-0455-3

Copyright © by AMERICAN SOCIETY FOR TESTING AND MATERIALS 1986
Library of Congress Catalog Card Number: 86-3323

NOTE

The Society is not responsible, as a body,
for the statements and opinions
advanced in this publication.

Foreword

The symposium on Rationale for Sampling and Interpretation of Ecological Data in the Assessment of Freshwater Ecosystems was held in Philadelphia, Pennsylvania, 31 October to 1 November 1983. ASTM Committee D-19 on Water sponsored the symposium. John M. Bates, Ecological Consultants, Inc., Sally D. Dennis, Ecological Consultants, Inc., and Billy G. Isom, Tennessee Valley Authority, presided as symposium cochairmen. Billy G. Isom is editor of this publication.

Related ASTM Publications

Validation and Predictability of Laboratory Methods for Assessing the Fate and Effects of Contaminants in Aquatic Ecosystems, STP 865 (1985), 04-865000-16

Ecological Assessment of Macrophyton: Collection, Use, and Meaning of Data, STP 843 (1984), 04-843000-16

Ecological Assessments of Effluent Impacts on Communities of Indigenous Aquatic Organisms, STP 730 (1981), 04-730000-16

Aquatic Invertebrate Bioassays, STP 715 (1980), 04-715000-16

Measurement of Organic Pollutants in Water and Wastewater, STP 686 (1979), 04-686000-16

Biological Data in Water Pollution Assessment: Quantitative and Statistical Analyses, STP 652 (1978), 04-652000-16

A Note of Appreciation to Reviewers

The quality of the papers that appear in this publication reflects not only the obvious efforts of the authors but also the unheralded, though essential, work of the reviewers. On behalf of ASTM we acknowledge with appreciation their dedication to high professional standards and their sacrifice of time and effort.

ASTM Committee on Publications

ASTM Editorial Staff

**Helen M. Hoersch
Janet R. Schroeder
Kathleen A. Greene
Bill Benzing**

Contents

Overview	1
Aquatic Monitoring: A Rationale for Obtaining and Interpreting Aquatic Ecosystem Chemical Exposure Data—WILLIAM J. ADAMS, THOMAS J. HOOGHEEM, AND PAUL R. MICHAEL	3
Rationale for Data Collection and Interpretation in the Northern Lakes Long-Term Ecological Research Program— T. K. KRATZ, J. J. MAGNUSON, C. B. BOWSER, AND T. M. FROST	22
Sampling Effort Required to Find Rare Species of Freshwater Mussels—WILLIAM P. KOVALAK, SALLY D. DENNIS, AND JOHN M. BATES	34
Rationale and Sampling Designs for Freshwater Mussels Unionidae in Streams, Large Rivers, Impoundments, and Lakes—BILLY G. ISOM AND CHARLES GOOCH	46
Characterizing the Influence of Natural Variables During Environmental Impact Analysis—RUSS T. BROWN AND DON L. DYCUS	60
Interpretation of <i>In Situ</i> Groundwater Quality from Well Samples— IVAN METZGER	76
A Conceptual Framework to Guide Aquatic Monitoring Program Design for Thermal Electric Power Plants—R. R. HORNER, J. S. RICHEY, AND G. L. THOMAS	86
Use of Detrended Correspondence Analysis in Evaluating Factors Controlling Species Composition of Periphyton—HARRY V. LELAND AND JAMES L. CARTER	101
Sampling and Interpretation of Algal Patterns for Water Quality Assessments—R. JAN STEVENSON AND REX L. LOWE	118
Leaf Processing in a Reservoir: An Experimental Approach— ALBERT C. HENDRICKS	150

The Role of Aquatic Macrophytes in Nutrient Flow Regulation in Lotic Ecosystems—BRIAN H. HILL	157
Developing a Sampling Strategy—JOHN CAIRNS, JR., AND J. R. PRATT	168
Author Index	187
Subject Index	189

ISBN 0-8031-0455-3