

Biological Indicators of Aquatic Ecosystem Stress



edited by S. Marshall Adams

Table of Contents

Contributors	vii
Symbols and Abbreviations	xi
1. Biological Indicators of Aquatic Ecosystem Stress:	
Introduction and Overview	1
<i>S. Marshall Adams</i>	
2. Biochemical Responses as Indicators of Aquatic	
Ecosystem Health	13
<i>Daniel Schlenk and Richard T. Di Giulio</i>	
3. Molecular Biomarkers in Aquatic Organisms:	
DNA Damage and RNA Expression	43
<i>Isaac I. Wirgin and Christopher W. Theodorakis</i>	
4. Physiological and Condition-Related Indicators	
of Environmental Stress in Fish	111
<i>Bruce A. Barton, John D. Morgan,</i>	
<i>and Mathilakath M. Vijayan</i>	
5. Genetic Responses as Population-Level Biomarkers	
of Stress in Aquatic Ecosystems	149
<i>Christopher W. Theodorakis and Isaac I. Wirgin</i>	
6. Immunological Indicators of Environmental Stress and	
Disease Susceptibility in Fishes	187
<i>Charles D. Rice and Mary R. Arkoosh</i>	
7. Histopathological Biomarkers as Integrators of	
Anthropogenic and Environmental Stressors	221
<i>Mark S. Myers and John W. Fournie</i>	

8. Evaluating Stress in Fish Using Bioenergetics-Based Stressor-Response Models	289
<i>Daniel W. Beyers and James A. Rice</i>	
9. Reproductive Indicators of Environmental Stress in Fish	321
<i>Mark S. Greeley, Jr.</i>	
10. Assessing Fish Population Responses to Stress	379
<i>Michael Power</i>	
11. Behavioral Measures of Environmental Stressors in Fish	431
<i>Edward E. Little</i>	
12. Community-Level Indicators of Stress in Aquatic Ecosystems	473
<i>Martin J. Attrill</i>	
13. Integration of Population, Community, and Landscape Indicators for Assessing Effects of Stressors	509
<i>Donald L. DeAngelis and John L. Curnutt</i>	
14. Assessing Contaminant-Induced Stress Across Levels of Biological Organization	533
<i>Lyndal L. Johnson and Tracy K. Collier</i>	
15. Statistical Considerations in the Development, Evaluation, and Use of Biomarkers in Environmental Studies	565
<i>Eric P. Smith</i>	
16. Biomarkers and Bioindicators in Monitoring and Assessment: The State of the Art	591
<i>Peter V. Hodson</i>	
Index	621