WILDLIFE TOXICOLOGY

Tony J. Peterle

Professor Emeritus Department of Zoology, The Ohio State University Columbus, Ohio



Contents

Foreword xi Preface xiii Introduction xv Acronyms xvii

1. Historical Perspectives 1

The early years3Major programs4Residue contamination and bioaccumulation9Population studies14After the bans16Some final thoughts20

2. Laws, Regulations, and Agencies Dealing with Toxic Substances in the Environment 22

TSCA 23 28 CERCLA FIFRA 28 NEPA 36 Federal agencies 37 State and local agencies 45 Monitoring programs 46 International policies 48

3. Elements, Chemicals, and Compounds Found in Environmental Pollutants 51

Environmental pollutant categories51Half-life and disappearance rates63Breakdown and metabolism67Environmental partitioning72

Sampling methods77Monitoring toxic trace elements80

4. Transport and Distribution in Natural Systems 85

Air 85 Water 92 Organisms 97 Sinks and recirculation 100

5. Accumulation in Organisms 104

Routes of intake106Storage sites and organs111Excretion and metabolism116Species, age, and sex119Synergism and antagonism124Predator/prey transfer125Resistance130

6. Lethal Effects on Organisms 133

General considerations 133 Aquatic systems 138 Avian systems 139 Mammals 141 Laboratory versus field testing 141 Examples of lethal effects 142 Lethal effects in the field 148 Testing programs 150

7. Chronic Effects on Organisms 157

Reproduction 157 169 **Behavior** Physiological responses 173 Predisposition to disease and other forms of stress 181 Tumor development and mutagenic affects 182 Carcinogenicity 183 Phenological aspects 184 Additive models for toxins 185 Conclusion 186

246

8. Effects on Ecosystems 189

Populations190Diversity192Productivity and biomass193Connectivity194Resistance and resilience196Nutrient retention and transfer198Geographic specificity199

9. Classic Examples 201

DDT	202	
PCB	207	
PBB	212	
Mercury		216

Appendix A	Chemical Compounds 221	
Appendix B	Scientific Names 233	
Appendix C	Sources of Chemicals and Scientific Names	244
Appendix D	Sources of Toxicity Data for Fish and Wildlife	2

Literature Cited 249 Index 301