

## BOOK REVIEWS

**Lake Erie and Lake St. Clair Handbook. Edited by Stanley J. Bolsenga and Charles E. Herdendorf. 1993. Wayne State University Press, Detroit, MI. 467 p. \$19.95 paper.**

Occasionally a scientific volume is published that appeals to the layperson, teacher, and scientist alike and serves as a particularly valuable reference source. This book should prove to be such a volume. As the preface states, "The editors of this book have attempted to present a comprehensive view of the environmental quality and natural features of Lake Erie, Lake St. Clair and their environs" (p. ix). It "describes the conditions, processes, and natural features of the coastal and offshore waters of Lakes Erie and St. Clair, and the St. Clair, Detroit, and Niagara Rivers" (p. 3). The authors have taken on a rather formidable task and have excelled in producing a volume that could serve well as an introductory textbook for a survey course on this part of the Laurentian Great Lakes.

The book is organized into a brief introductory chapter followed by major chapters on the lithosphere (with subsections on physiography, bedrock geology, glacial geology, sediments and beach deposits, coastal processes, mineral resources, and natural features of special interest), atmosphere (climate, winds, solar radiation, severe weather), the hydrosphere (water levels and water budget, water temperature, currents, waves, storm surges and seiches, and ice), and the biosphere (lake ecology, physical, biological, and chemical structure of Lake Erie, lake flora and fauna, avifauna, and wild game). The biosphere chapter devotes forty-six pages to the origin, value, biota, and changes in coastal wetlands of the two lakes, with extensive descriptions of fifteen specific wetlands.

The editors compiled or wrote most of the material for the chapters and were assisted by Bonnie James (The Atmosphere), Theodore Ladewski (The Hydrosphere), Laura Fay (Water Chemistry), Jeffrey Reutter (Fishes), and Sandra Schuessler (Birds). The literature citations, including over 270 references, are followed by a handy twenty-page glossary and a detailed index. Several references on bird identification are buried within the text (pp. 329-330) rather than placed with the other references.

The broad title suggests that this book covers most topics of interest to most people. Certainly it covers a wide range of topics in varying detail. It focuses, however, on the natural history and ecology of these lakes, as opposed to their history of human use and abuse, and surprisingly little information is included regarding human impacts and environmental issues. For example, readers seeking knowledge of the history, extent, and trends of toxic substances in the lake sediments and waters will generally be disappointed; they will have to consult Burns (1985) and, for more current coverage of some impacts, recent special issues of the *Journal of Great Lakes Research* (e.g., Vol. 18(4) 1992, and Vol. 19(2) 1993) and other journals. The chapter on the hydrosphere lacks any mention of the controversial effects of icebreakers and the extension of the shipping season during periods of ice cover. Nor is water pollution discussed in that chapter. Mercury is the only major pollutant of the sediments and food web that

is presented in the chapter on the lithosphere (pp. 80, 82, 84). By reading the sections on fishes and avifauna, one would never be aware of the historical and continuing reproductive and physiological problems in these organisms caused by persistent toxic materials such as DDT, PAHs, and PCBs in several areas of Lake Erie and its connecting channels. Fortunately, an introduction to the effects of eutrophication and oxygen depletion is provided. Despite the tremendous impact created by the zebra mussel during its short tenure in lakes St. Clair and Erie, the index lacks reference to "zebra mussel," "exotic species," or "introduced species." I could find only a single short sentence (p. 286) which refers to the zebra mussel as simply a "new invader," with not even a figure provided. Perhaps the chapter on the biota was completed prior to the late 1980s, before its ecological and economic importance was realized. Otherwise, the omission of this organism, as well as the spiny water flea and other species that invaded in the last decade, is incomprehensible.

One of the more appealing aspects of the book is the inclusion of practical information. For example, the chapter on the atmosphere includes thunderstorm and tornado safety tips (pp. 159 and 163) and how to use marine wave and weather forecasting services (pp. 215-219). The best birding sites are described at length (pp. 331-355) in the avifauna section.

The editors have indeed assembled a wealth of useful information from widely scattered sources. Because they have presented most of this information in its original form, some inconsistency in the use of scientific units (e.g., Fahrenheit vs. Celsius, metric vs. British) occurs throughout. Textual descriptions of the various topics are in almost all cases illustrated by clearly printed and readily understandable drawings, graphs, or tables. These must be studied critically, however, because there are several errors. As examples: Figure 3.52 (p. 147) purports to show comfort zones for the eastern half of the U.S. in July but omits all of the eastern U.S. south of Missouri, Kentucky, and Virginia! Figure 4.18 (pp. 192-193) twice refers to the island region as eastern Lake Erie. In Figure 5.29 (p. 272) the plants labeled "floating plants" are really rooted floating-leaved plants as opposed to freely floating plants. In Figure 5.37 (p. 282) the two worms labeled as "sludge worm (oligochaete)" are oligochaetes, but neither of the species shown is found in areas of severe organic pollution where the sludgeworms thrive. As an important omission in Figure 5.53 (p. 377), swamp loosestrife (*Decodon verticillatus*) is shown, but the devastating purple loosestrife (*Lythrum salicaria*) is neither shown nor listed in the index. It receives two sentences of text (p. 396).

Given its breadth of coverage, the *Lake Erie and Lake St. Clair Handbook* is well organized, informative, and enjoyable to read. It will probably receive frequent use as a regional reference to augment the standard limnology textbooks.

#### LITERATURE CITED

- Burns, N. M. 1985 *Erie the Lake that Survived*. Rowman and Allanheld Publishers, Totowa, NJ. 320 pp.

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**Full Circle: Restoring Your Habitat to Wilderness.**  
**Bayliss Prater and Kathleen McNeal. 1993. Last Resort**  
**Press, Willard, OH. 127 p. \$15.00 paper.**

Over forty years after publication of the benchmark conservation book, *A Sand County Almanac* by Aldo Leopold, the spirit lives on. In *Full Circle*, authors Bayliss Prater and Kathleen McNeal use a different tact to convey their message. Instead of providing a philosophical discussion or a theoretical model of how to restore one's habitat to wilderness, they have done it.

The authors have spent a considerable amount of time and energy to restore their 78-acre Huron County farm to wilderness habitat. Their book is divided into ten sections which serve to clarify and illustrate the four primary needs of wildlife: vegetation, food, water, and shelter. The first section on wetlands reflects the current national interest in both restoration and mitigation of lost habitat. Of Ohio's 5,000,000 acres of historical wetlands, about 10% of our wetlands remain. If the biological significance of this change doesn't give one reason for concern, then nothing will. Ohio's proximity to Lake Erie and generally ample groundwater supplies have led us to complacency. The decrease in capacity of the Ogallala aquifer in the High Plains states of Nebraska, Colorado and Texas illustrates the direct social and economic impact of modern agriculture on water supplies. At the authors' Last Resort farm, twenty acres of varied wetland habitat have been restored for wildlife.

Cooperative help from state and federal agencies was critical in the planning and construction of the wetland areas at the Last Resort. This section sets the tone for the remainder of the book, which is written in a concise, Do-It-Yourself format.

In the following section on grasses and legumes, one learns exactly what kinds of plants are necessary for either cool-season or warm-season grassland management. Details are provided concerning seeding rates for grasses and the proper time for planting and mowing.

Other sections deal with the advantages of providing a diversity of habitat for wildlife: shrubs and trees, old field, and cropland. The planting of native species and the use of organic fertilizers are encouraged throughout the text. The application of herbicides is discouraged and the use of other kinds of pesticides is not generally necessary if one considers the biological alternatives (bats eat pest insects, raptors consume rodents, etc.).

The idea of building brush piles for wildlife is presented in the section on old fields. Of particular interest was the use of tree clippings from a local source which effectively recycled this material for a useful purpose. This was a valuable idea since open burning is not permitted in many areas and landfills are being needlessly filled with tree and grass clippings, leaves, and discarded lumber.

Farmers will undoubtedly be receptive to many of the conservation ideas presented in the section on croplands, since many of them have already embraced the value and protection of wetlands. Highlights of this section include discussions on harvesting techniques, fencerows, and windbreaks.

The planting of small food plots for wildlife is a practical alternative for the farmer or landowner. In the section on

food plots information is given on the value of corn, buckwheat, Japanese millet, and other grains as both a food source and cover for wildlife. Small plots of fruit trees and mast producers, such as oak and hickory, are also valuable as a food source, shelter, and nesting sites.

Nesting sites are discussed more thoroughly in the section on poles (perches) and holes (cavities). This is one of the best sections in the book and provides detailed information for the construction of nesting boxes for many bird species. The authors have utilized discarded utility poles to make nesting platforms at the Last Resort, an idea which could have a significant impact in areas with populations of eagles or ospreys. Nesting or resting boxes for several kinds of small mammals are also discussed.

The value of woodland and riparian habitats are discussed in two other sections of the book, with recommendations for long-term protection and establishment of management goals. Around 94% of Ohio's natural resource base of woodlands is privately owned.

A final section addresses urban landscapes and backyard birding. The authors note that vanishing populations of wildlife are drawn to urban settings that furnish the proper habitats. Components of other topics discussed in the book can be used on a smaller scale in urban areas. Particular detail is given to two popular birds, the eastern bluebird and the ruby-throated hummingbird, and their favored habitats.

Prater and McNeal have written an accurate and well-organized account of what it takes to establish or revitalize wildlife habitat in the midwest. In the vein of Louis Bromfield's *Malabar Farm*, the authors succeed in bringing attention to Ohio's conservation ethic. A variety of good black-and-white photographs serve to illustrate the text, and the use of boldface type draws attention to major terms and concepts.

Many readers will be dismayed at the lack of an index, glossary, or a list of literature references. In the authors' introduction, they mention that a companion source and plan book is being prepared and it is definitely needed. At various places in the text it would have been very helpful to have some cost estimates for the work at hand. Sources for seeds, shrubs, and other plants could have been included in an appendix and would have saved time for the reader. The same could be said for listing contact names and addresses of state and federal agencies, such as the Cooperative Extension Service, Soil Conservation Service, and Ohio Department of Natural Resources, as well as conservation groups like Quails Unlimited and Pheasants Forever.

The last section of the book lists the scientific names of birds, plants, and mammals mentioned in the text and would be more appropriate as an appendix to the other sections. It was disappointing to find that the authors chose not to include a summary or conclusion for the book, as this would have helped to bring together major concepts presented in other sections of the text. Little attention was placed on the possible adverse aspects of creating wildlife habitat. Will wetlands produce hordes of hungry mosquitoes? Will grasslands become infested with ticks carrying Lyme disease?

This book contains a great deal of practical advice for

restoring wildlife habitat and, in its own straightforward, no-frills approach, is an important tool that can be used for educating students in environmental conservation and management. Property owners will find it full of ideas that may be put immediately to use. This is not a gene-splicing, numbers crunching or hair-splitting kind of book. The authors are to be commended for recording their efforts and sharing their accumulated knowledge, oftentimes in a humorous and inspirational way.

*Full Circle* is a good investment for the future of wildlife. In his return to a simpler, altruistic way of life, Prater has remarked, "I took off my watch and threw it away." Perhaps the rest of us should check our watches now, for time may be running out.

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**Once Upon a Tree: Life from Treetop to Root Tips. James B. Nardi. 1993. Iowa State University Press, Ames, IA. 103 p. \$5.00 hardcover.**

Life is like a spider's web. We are not the weaver; we are only a strand. Dr. James B. Nardi gives us a close-up view of the web as it relates to the interconnecting life associated with a typical tree. Through his presentation and detailed illustrations, we find that the Biblical path "from ashes to ashes and dust to dust" may have many intermediate and interesting side trails.

Dr. Nardi opens the book with an illustrated diagram showing the interactions in the web of a tree and its supporting community. We are reminded that all things are connected in the web of life. This introduction is followed by eleven chapters detailing the web strands in the life of a tree throughout the seasons and yearly cycles.

In spring the flowering and pollination process begins with insects and the wind playing a major role in uniting the male and female flowers. As warmer weather arrives, so do the many varieties of fungi and insects. The fungi and trees show an interdependence with fungi transferring water and minerals from the soil to the tree in exchange for the tree's sugary sap. As summer concludes, the fungi display themselves on the soil surface in the form of colorful mushrooms.

The tree supports the needs of a variety of insects and birds. Sap gives nutrients; bark, twigs, and leaves provide homes and places for laying eggs; leaves are also a source of food. Insects attract other insects as many cooperatively exist; however, by providing such an attractive environment predators are also drawn to the tree. Wasps and birds seek out the insects; hawks and owls keep a watchful eye for the birds and squirrels.

With the coming of fall, the tree presents a rich harvest of fruits and nuts for winter storage which entices other varieties of animals. Winter can be cold and many of the creatures of this community find a home within the hollows of the tree and its many parts to await spring and another cycle of the web.

Through this story we are able to closely inspect our tree, and we are given a view of and information about even its smallest inhabitants. This close inspection

introduces many unfamiliar creatures to the reader. Presented as a community, the tree provides a place where the members are linked together and to the tree itself. They must cooperate, coexist, and compete among each other. In doing so each receives the energy it needs to survive. Interestingly, the tree is the only life form in the web which does not receive its energy from another member of the community. Instead, the tree receives its energy from the sun.

From the air we breathe to our uses of tree products, the tree is linked to mankind, and through its gifts the quality of our life is greatly enhanced. The many creatures who also depend upon the tree are part of that relationship as well. Nature reflects mankind's past behaviors. Lichens on the tree recede and disappear with pollution. Insects and animals lose their homes and are reduced in number. Also, the lack of new growth in some species of trees is directly linked to the decline of specific species of birds or insects.

Each chapter of the book closes with a conclusion entitled "Learning from Trees" in which the author reinforces the chapter topic by giving activities the reader or a teacher could use to further develop the idea. These activities require little if any special equipment, and they are appropriate for both upper elementary and junior high age students. Other useful project information includes dimensions, diagrams, and directions for nest boxes for different species of birds and drawings of the tracks of various animals associated with trees.

A glossary with language derivations and an extensive index make the book especially useful to a reader doing research. The text is extensively illustrated with detailed black and white drawings with the actual size of the insect, pollen, seed, etc. given beneath the illustration in the form of a metric scale which depicts the minuteness and intricate detail of many of these life forms. Although the principle of recycling and reuse is endorsed, this title would be greatly enhanced by a larger format, color illustrations and paper of a higher quality such as acid-free or glossy. This book meets selective needs of biology students and is not recommended for purchase by libraries or departments on a limited budget. *Once Upon a Tree* is a story of life: a microcosm of the variety and multitude of interrelated life forms that can be found throughout our world.

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**Foundations without Foundationalism. Stewart Shapiro. 1991. Oxford Logic Guides, No. 17. Clarendon Press, Oxford University Press, Oxford and New York. 277 p. \$75.00 cloth.**

This recent addition to the distinguished Oxford Logic Guides series continues the tradition of scholarly yet readable studies which cover an active area of research in logic. The focus of this volume is second-order logic. Research in 2nd-order logic has taken place against a background in which the subject itself has come under fire from one of the most distinguished logicians

philosophers of this century: Willard Van Orman Quine. Appropriately, Shapiro's book is about equally divided between an account of the logico-mathematical results which have been achieved by researchers in the field and the philosophical disputes which have surrounded the subject itself. Regardless of how one cleaves on these philosophical matters, the study of 2nd-order logic is an excellent foil for a fuller understanding of 1st-order logic. That this is the case can be seen from the startling contrast between the general meta-properties of the two systems: a) the deductive apparatus of 1st-order logic is complete whereas no complete deductive apparatus can be given for 2nd order logic, b) compactness holds for 1st-order logic but fails for 2nd order logic, c) the Lowenheim-Skolem result holds for 1st-order logic but fails for 2nd-order logic, and, perhaps the most striking result, d) the Godel result regarding the incompleteness of elementary arithmetic fails for 2nd-order logic. Elementary arithmetic can be given a complete categorical formalization in 2nd-order logic.

The hundred pages of Part II of the book lay out the major results of 2nd-order logic studies and the general contrast between these results and those of 1st-order logic. This technical and complex material is laid out with the skill of the researcher thoroughly familiar with his subject. Shapiro is able to anticipate and answer the "why not" questions which greatly aid the understanding of the material. The reader is almost invariably informed why a conditional result does not reverse (why the converse does not hold). This material on 1st and 2nd-order logic alone makes the book an excellent addition to the library of any person whose research requires a grasp of symbolic logic and its relation to the foundational studies of this century. One example of the difference between 1st and 2nd-order logic will perhaps give the flavor of the general difference between the two systems. Let  $R$  be characterized by postulates which make it transitive and asymmetric. It is possible to formulate a sentence in 1st-order logic which characterizes the notion of infinity:

$$(\exists x)(\exists y)Rxy$$

However, the notion of finitude will not be obtained by mere denial of the sentence. In fact the notion of finitude cannot be formulated in 1st-order logic. Consider by contrast, the 2nd-order counterpart to this sentence:

$$(\exists R)((\text{trans}R \wedge \text{[asym]}=R \wedge (\exists x)(\exists y)Rxy)$$

The denial of this sentence captures the notion of finitude. The domain  $D$  of interpretation of this sentence

(the range of the  $x,y$ ) cannot be infinite. If the domain of interpretation were infinite, then since  $R$  ranges over the elements of the power set of  $D \times D$ , a transitive, asymmetric relation over  $D$  would exist. The denial of the 1st-order sentence, by contrast, could have an interpretation in which the domain of interpretation is infinite and yet the sentence  $(\neg(\exists x)(\exists y)Rxy)$  is true.

Mr. Shapiro's characterization of 2nd-order logic emphasizes the necessary semantic aspect of "true" 2nd-order logic. It is not sufficient to characterize 2nd-order logic by syntax. Characterizing 2nd-order logic by quantification over the predicate position is not sufficient to guarantee the noted properties of the system. This is underscored by the author in several places and notably in the section on Henkin semantics (pp. 73-4, 75-6). This is a key section, and regrettably a section in which the author trots out differences between Henkin semantics and standard semantics with very few "whys" and "why not's."

The motivating theme of the work, set forth in Chapter 2, concerns Shapiro's view of what logic should be. Logic should be about foundations (good) without being foundational (so-so) or engaging in foundationalism (bad). Since Shapiro does not name these positions and one cannot contrast "foundations" with "foundational" or "foundationalism," the positions will be referred to by their ranking. Good logic concerns the semantic validity of mathematical reasoning and correspondingly attempts to codify actual mathematical practice. So-So logic does not seek to establish a single firm foundation for mathematics but does seek to establish a firm syntactic inference scheme. Bad logic attempts to establish a single firm foundation for mathematics (usually 1st-order logic plus set theory). Good logic will, at least temporarily, adhere to 2nd-order logic as a preferred codification of actual mathematical practice until a better notion of semantic validity is worked out. Other reviewers have had trouble with the distinction between the foundations view of logic and the foundational view of logic. It has been called a false dichotomy. (Burgess, *Journal of Symbolic Logic*, Vol. 58, March 1993). It is as if Shapiro is insisting that one choose between proof theory and model theory.

More will undoubtedly be said on these matters between Shapiro and his critics. However it plays out, there can be no doubt about the author's masterful scholarly comprehension of his topic and the value of the work as the premier reference on 2nd-order logic and as a source of many insights regarding mathematical practice.

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