Sedges of Indiana and the Adjacent States: The Non-Carex Species

By Paul E. Rothrock. 2009. Indiana Academy of Science, 140 North Senate Avenue, Indianapolis, Indiana 46204-2207 USA. xiv + 270 pages, 45 USD.

This book provides an authoritative treatment of the identification, distribution, and ecology of the 88 species in the genera *Bolboschoenus*, *Bulbostylis*, *Cladium*, *Cyperus*, *Dulichium*, *Eleocharis*, *Eriophorum*, *Fimbristylis*, *Fuirena*, *Kyllinga*, *Lipocarpha*, *Rhynchospora*, *Schoenoplectus*, *Scirpus*, and *Scleria* that are found in Indiana. In addition to the species that are known to occur in the state, several taxa found in adjacent states (Illinois, Kentucky, Ohio, Michigan) but not yet found in Indiana, including members of the additional genera *Isolepis*, *Scirpoides*, and *Trichophorum*, have been included in the keys and species treatments.

The book begins with a foreword and a preface, the latter of which, although brief, provides an interesting personal insight into how the author began his now 35-year fascination with sedges. The main body of the book begins with an introductory chapter describing sedges in general as well as the natural regions of Indiana. The second chapter focuses on sedge morphology, including a comparative table of the three major graminoid families, Cyperaceae, Juncaceae, and Poaceae, and is complemented by several colour photographs. This chapter is followed by a brief chapter dealing with the basics of nomenclature and a summary of the 12 most common non-*Carex* sedges in Indiana, with some explanatory notes about the species (these 12 species are provided with their own key in an appendix, intended to assist sedge newcomers by enabling them to learn the common species first).

The nomenclature section is very brief, but it does cover the most important concepts and it is supplemented by appendices that relate the names used in older treatments, such as C. C. Deam's *Flora of Indiana* (1940) to those found in the more modern treatments in the *Flora of North American North of Mexico. Volume 23. Magnoliophyta: Commelinidae (in part): Cyperaceae* (2002). I have a bit more difficulty with the section on the 12 most common species, and in particular, the approach to providing a key for them. This approach implies that the novice will know that s/he has one of these 12 species. However, it is quite possible that a species other than one of these 12 will be quite abundant at a particular place, and the user could make the understandable assumption that it must be one of the 12 most common species in the book. It is perfectly justifiable to include a discussion of the 12 most common species, but the inclusion of the key could be misleading, especially for beginners who may not think of checking other possibilities.

The next chapter discusses the habitats and distribution patterns of the non-*Carex* sedges in the state and introduces the reader to tools such as coefficients of conservatism and wetness categories that provide estimates of the breadth of habitat tolerances and moisture regime preferences. This chapter provides the basis for the way in which habitat preferences are described in the species treatments later in the book.

A summary of the relationships between sedges and humans is provided in the next chapter. Several species of sedges are, or were, economically important in various parts of the world. For example, *Cyperus papyrus* provided the original source of paper for the ancient Egyptians, as well as being a source of material for weaving mats, making canvas for sails, etc. Several species of sedges are used for ornamental, landscaping, and ecological restoration purposes, others are used for food or drink, some serve as important food items for wildlife, and some species, such as yellow nut-sedge, *Cyperus esculentus*, are considered to be among the worst weeds in the world.

A chapter on the biology of sedges provides more detail on nutrient uptake, mycorrhizal relationships, adaptation to wet soils, photosynthetic adaptations, dispersal, and germination ecology. Each of these topics is dealt with briefly, but a good overview is provided that should pique the interest of the reader. This chapter also includes some of the relatively recent ideas on the evolutionary relationships of the genera of sedges relative to other monocots and to each other, although this area of research is in a state of flux, with molecular studies frequently providing new insights.

The main body of this book is composed of the keys and species treatments. There is a key to the genera occurring in Indiana and nearby states, as well as keys to the species in each genus. Since achenes provide important distinguishing characters among genera and species, a set of excellent illustrations of achenes follows the generic key. Sets of illustrations of the achenes of the species of *Eleocharis* (spike-rushes), *Rhynchospora* (beak-rushes), and *Scleria* (nut-rushes) follow this. It probably would have been more sensible to place the illustrations of the achenes of species within individual genera in the appropriate location within the text where these genera are discussed, but perhaps the placement of all line drawings together in a group was done for formatting purposes.

Each species treatment follows a consistent format, which is explained at the beginning of the section on species accounts. The format is user-friendly, and it contains scientific and common names, synonyms, a description of the important identification features, a description of habitat preferences, including likely associated species (not restricted to sedges), a county range map as well as a general map of occurrence and status in adjacent states, and often, photographs of

habit, details of the inflorescence and/or achenes, a statement on the status of the species in Indiana, and any other remarks that the author felt were helpful in identifying or in understanding the distribution or ecology of the species in the state. In general, I found the information provided in the species treatments to be relevant and interesting.

Most aspects of the production, content, and appearance of this book are attractive, informative, and accessible to the non-expert and expert alike. The author's writing style is entertaining at times, in addition to being authoritative. The most disconcerting aspect of the book is the relatively frequent occurrence of grammatical errors, reflecting poor copy editing. Nevertheless, overall, this book provides a very good summary of the state of knowledge of the identification, distribution, status, and ecology of the non-*Carex* sedges of Indiana, and I recommend it to botanists and field biologists in the American Midwest. It contains information that will be useful beyond this geographic range as well.

Literature Cited

Deam, C. C. 1940. Flora of Indiana. Department of Conservation, Division of Forestry, Indiana.

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ENVIRONMENT

Ecology of Fragmented Landscapes

By Sharon K. Collinge. 2009. Johns Hopkins University Press, 2715 North Charles Street Baltimore, Maryland 21218-4363 USA. 340 pages, 70 USD Cloth.

Ecology of Fragmented Landscapes is an intriguing look at a growing and increasingly problematic phenomenon: fractured lands that significantly affect biodiversity. Ecologist and evolutionary biologist Sharon Collinge synthesizes decades of research on fragmented landscapes into 12 chapters discussing topics such as fragment size and isolation, animal and plant movement, species interaction, parasites and disease, restoration, and ecological planning. The main purpose of the book is to summarize current knowledge related to fragmented landscapes.

The "Animal and Plant Movement" chapter is particularly interesting. Collinge starts by discussing differing types of animal and plant movement, then points out that in fragmented landscapes species often encounter obstacles in their attempts to travel from one suitable habitat patch to another. She goes on to discuss the highly debated effectiveness of corridors, which have their advantages and disadvantages, and which work for some species and certain situations, but not all—not for the species that "appear to move across landscapes in mysterious and unexplained ways" (page 131), some of which benefit more from stepping stones of habitat patches than from linear corridors.

Collinge stresses that we need to learn more about the conditions in which corridors can be expected to facilitate movement. She points out that it is also essential to better understand movement, along with the ways in which a species' perception and capacity for movement are integrated with landscape patterns.

It is also important to understand interactions in landscapes, as discussed in the "Species Interactions" chapter. Collinge writes about competition, predation, pollination, seed dispersal, mycorrhizal associations, and herbivory and seed predation—as well as a fascinating and little-studied phenomenon known as "floral larceny" (page 162)—in various negative and positive configurations. She ends the chapter by stressing that many questions remain unanswered, questions that are important in planning and managing landscapes that support rich biodiversity.

In the "Restoration" chapter, Collinge presents a variety of fascinating case studies involving both human and natural landscape restoration. The "Ecological Planning" chapter discusses a wide range of activities and approaches that have as a common denominator the integration of ecological knowledge with deliberate human action and landscape change, from greenways and new urbanism to systematic conservation planning and initiatives such as the Living Landscapes Program and the Wildlands Project.

Collinge leaves us with final thoughts on key concepts and promising research directions. Stressing that many opportunities exist to incorporate current knowledge about fragmented landscapes into actions that will "stem the tide of biodiversity losses and the degradation of ecosystem services" (page 279), she encourages readers to develop creative solutions that will meet landowner and stakeholder needs for information and incentives to make positive landscape change.

Ecology of Fragmented Landscapes is a fascinating, thorough, and positive book, packed with scientific and technical content—an excellent resource for teachers and students of landscape and restoration ecology