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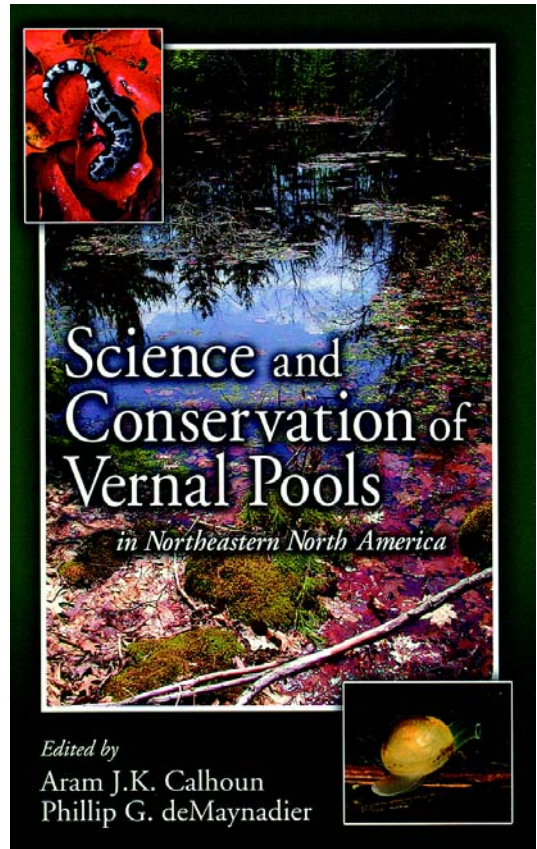
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Geographically isolated wetlands are isolated in that they are not adjacent to permanent waters such as lakes, rivers or streams, although they are not hydrologically or ecologically isolated from surrounding ecosystems (Tiner 2003). They are considered wetlands as they periodically dry, although the duration of inundation varies greatly among individual wetlands, from several weeks to years (for wetlands that dry only during years of severe drought). The 2001 U.S. Supreme Court ruling in the case *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* effectively removed small isolated wetlands from federal protection in the U.S., and in a sense consolidated and intensified regional and local efforts to conserve these spatially small but ecologically important systems in the U.S. Nowhere has this been more the case than with vernal pools in northeastern North America.

As the name implies, vernal pools are depressions that fill in the spring and dry completely during summer months. The edited volume, *Science and Conservation of Vernal Pools in Northeastern North America*, describes the ecology of vernal pools and their associated wildlife, and demonstrates the considerable regional and local efforts that have gone into conserving these systems.

The editors, Aram J. K. Calhoun and Phillip G. deMaynadier, adapt a working definition of vernal pools as “temporary to semi-permanent pools occurring in shallow depressions that typically fill during spring or fall and may dry during summer or in drought years.” As a result



of a lack of surface water connections to more permanent aquatic habitats, vernal pools lack fishes and provide habitat for organisms adapted to temporary waters, including several frogs, toads and salamanders (specifically *Rana sylvatica* and *Ambystoma* spp.) and a number of invertebrates (e.g., fairy shrimp; *Eubranchipus* spp.).

As detailed by the authors of individual chapters, the complex life cycles of many of the organisms associated with vernal pools presents a challenge to conservation. Specifically, many species breed in pools, but require surrounding upland habitat to complete their life cycle. Moreover, the hydrology and thus the habitat value of individual pools vary greatly among years, and the persistence of populations may

rely on a collection of ponds and the quality of the intervening terrestrial habitat. The conservation implications are that land planners and managers must consider habitat quality of individual pools, including the influences of adjacent land use on hydrology and water quality, maintenance of terrestrial habitat adjacent to pools, and maintenance of dispersal among pools. Taken together, the science presented in the volume clearly indicates a need for comparative studies at the landscape scale, where a landscape is defined as a forested area containing a collection of pools. Comparison of population dynamics and ecosystem function among landscapes with differing amounts and configurations of vernal pools would help evaluate the potential keystone ecosystem nature of pools in northeastern forests. Keystone ecosystems are defined as those that play a larger role in landscape function than their spatial extent would suggest (Stohlgren *et al.* 1997).

The scope of the book includes the forested, previously glaciated portions of northeastern North America, including portions of the United States and Canada. However, the editors and the majority of chapter authors (31/33 = 94%) are from U.S. institutes, giving the volume a decided U.S. tone. There is also a decided focus on amphibians in many chapters as openly admitted by the editors in their introductory chapter. This focus on amphibians makes sense as these organisms are the most obvious indicators of vernal pools and have attracted public support for vernal pool conservation.

*Science and Conservation of Vernal Pools in Northeastern North America* is intended as a compliment to the similarly titled book, *Vernal Pools: Natural History and Conservation* by Colburn (2004), and accomplishes that goal in many ways. For example, Colburn (2004) focuses on the ecology and natural history of vernal pool organisms with an emphasis on invertebrates and a single (but substantial) chapter devoted to conservation. The Calhoun

and deMaynadier (2007) volume summarizes natural history information for many of the same groups of organisms, including a chapter on invertebrates authored by Colburn, but focuses more on amphibians and includes multiple chapters addressing conservation issues.

*Science and Conservation of Vernal Pools in Northeastern North America* is directed at natural resource managers and decision makers; over one-third of the text is devoted to conservation and each chapter ends with sections titled "Conservation Implication" and "Summary." However, others including academics, environmental consultants, educators and amateur naturalists will find the book interesting and informative.


The book has a brief introductory chapter by Malcolm L. Hunter, Jr. that briefly presents the values and challenges of conserving vernal pools. This chapter is followed by three sections addressing the physical setting, biological setting, and conservation of vernal pools; an index is included as a fourth section. The section on physical setting is the shortest and includes three chapters describing classification (Chapter 2 by R. D. Rheinhardt and G. G. Hollands), hydrology and connectivity (Chapter 3 by S. G. Leibowitz and R. T Brooks), and vernal pool mapping (Chapter 4 by M. R. Burne and R. G. Lathrop, Jr.). The inclusion of classification in the section on physical setting is logical as the definition of vernal pools is based on geomorphology and hydrology as much as on biological communities (although ecological integrity is often assessed based on the presence of indicator species, primarily amphibians). Managers and policy makers will find the practical guidance on mapping vernal pools quite useful. The chapter on hydrology and landscape connectivity emphasizes the physical and biological connections among individual vernal pools and between pools and the surrounding forest, a theme followed throughout the remainder of the book.

The section covering biological settings includes individual chapters describing plants (Chapter 5 by A. Cutko and T. J. Rawinski), invertebrates (Chapter 6 by E. A. Colburn, S. C. Weeks, and S. K. Reed), and amphibians (Chapter 7 by R. D. Semlitsch and D. K. Skelly), as well as a chapter devoted to reptiles, birds and mammals (Chapter 9 by J. C. Mitchell, P. W. C. Paton, and C. J. Raithel). Also included in the biological settings sections is a chapter describing the population- and genetic-level ramifications of the complex life cycles of amphibians (Chapter 8 by J. P. Gibbs and J. M. Reed), an assemblage that has become a flagship group for vernal pools. The lists of plants (Chapter 5) and of reptiles, mammals and birds (Chapter 9) presented in this section compliments a list of other fauna presented by Colburn (2004).

The third and largest section of the book addresses conservation and includes chapters tackling both threats to vernal pool biodiversity and conservation actions. The section begins with a chapter (Chapter 10 by W. S. Mahaney and M. K. Klemens) that reviews federal, state and local policy relevant to conserving vernal pools. From the standpoint of threats, chapters address contaminants (Chapter 11 by M. D. Boone and B. D. Pauli), urbanization (Chapter 12 by B. Windmiller and J. K. Calhoun) and forest management practices (Chapter 13 by P. G. deMaynadier and J. E. Houlahan). In both of the latter chapters, detailed and specific management recommendations are presented. From the standpoint of conservation action, individual chapters address policy, education (Chapter 15 by H. J. Gruner and R. D. Haley) and community based conservation (Chapter 16 by Calhoun and Reilly). Of the three sections, the chapters in the third section seem the least organized and might have been better organized as two sections, one addressing threats and one addressing conservation actions. However, chapter organization in the third section does not distract substantially from the overall message, and conservationists will find the final two

chapters on education and community-based conservation particularly useful and inspiring.

Overall, *Science and Conservation of Vernal Pools in Northeastern North America* provides an application of landscape ecology specifically to vernal pools. As such, the volume may find an audience beyond northeastern North America. Small isolated wetlands are common in many parts of North America, including Carolina bays of the Atlantic Coastal Plain, Prairie potholes of the mid west, and Cypress domes of Florida. Yet, these types of ecosystems can also be found on other continents including seasonal wetlands or “mares” of Africa and temporary wetlands of Asia. While the specific species found in temporary or seasonal wetlands of other areas will be different than those found in vernal pools, their adaptations and the community ecology and ecosystem function are likely to be similar (Wellborn *et al.* 1996).

In conclusion, *Science and Conservation of Vernal Pools in Northeastern North America* includes a clear explanation of the science that leads directly to the policy and management recommendations presented in the book. For managers and policy makers in Northeastern North America the volume will be quite valuable; those working in temporary wetlands outside of northeastern North America may also find examples and case studies applicable to their systems. The consistency and level of writing among chapters makes the volume accessible to managers and policy makers, but other groups will surely find much information of interest. The coverage of specific management practices and recommendations across multiple spatial scales, from individual wetlands to forest landscapes, is a particularly valuable aspect of the book. Along with Colburn's *Vernal Pools: Natural History and Conservation*, *Science and Conservation of Vernal Pools in Northeastern North America* should form an authoritative two-volume set and find a place on the bookshelf of those interested in wetland science and conservation in North America and beyond. 

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