

## BOOK REVIEW

*The Herbaceous Layer in Forests of Eastern North America*, 2nd edition, edited by Frank S. Gilliam. 2014. 658 pp. ISBN 978-0-19-983765-6 \$99.00 (alkaline paper, hardcover). Oxford University Press, Oxford, UK.

The forest understory: botanists adore it, deer eat it, foresters step over it, and, thanks to Frank Gilliam and his colleagues, ecologists now know a lot more about the herbaceous layer that carpets the ground beneath the trees. Just over 10 years ago (in 2003), Frank Gilliam and Mark Roberts edited the first edition of *The Herbaceous Layer in Forests of Eastern North America*. When that edition was published, fewer than 10,000 papers (*ca.* 1950–2000) had been published on the ecology of “the forest stratum composed of all vascular species  $\leq$  1 m in height” (p. 4: definition of the herbaceous layer). According to Gilliam’s data in Chapter 1 of the new edition, however, in the last decade alone, more than 20,000 more papers have been added to this canon. This accelerating interest undoubtedly was sparked by the publication of the first edition of *The Herbaceous Layer*, and it would be no surprise if the publication of the second edition fanned the intellectual fires still further.

The second edition of *The Herbaceous Layer* is 50% longer than the first. It includes eight new chapters (of 22 total) and nearly twice as many references in its 124-page-long, exhaustive bibliography. All of the original chapters are still present and most have been substantially updated: authors and sections have been added, literature reviews generally cover current work, and nomenclature reflects newer floras. The production is, for the most part, better as well. The type-face is crisper and, although a point or two smaller in size, easier to read. Graphs have been redrawn, jittery cross-hatching eliminated in favor of gentle shading, and font labels applied consistently across chapters. On the other hand, presumably in the interest of saving some paper and keeping the book to a manageable size, margins extend nearly to the top and bottom of each page and the paper-weight is thin, leading to bleed-through of text and figures. The resulting tome at times feels as dense as the forest understory it describes.

*The Herbaceous Layer* is divided into four parts. The first includes three chapters on “The Environment.” In these chapters,

the “environment” refers to nutrient cycling and the vernal dam (by Robert Muller), ecophysiology (Howard Neufeld and Donald Young), and biotic-abiotic interactions (Wendy Anderson). Of these three chapters, Neufeld and Young’s is the most thoroughly updated; it includes an entire new section on ecophysiological responses of forest herbs to climate change and warming experiments, and much expanded information on carbon gain and respiration. In contrast, Muller and Anderson’s updates are restricted to a few new references.

The second part covers “Population Biology.” In the first edition, this part had but a single chapter—conservation of rare understory herbs (by Claudia Jolls). For the new edition, Jolls thoroughly revised her chapter in partnership with Dennis Whigham and highlighted new efforts in understory plant conservation, including the Smithsonian Institution’s new North American Orchid Conservation Center. This part now also includes a completely new chapter on mating systems and floral biology (by Carol Goodwillie and Claudia Jolls). This chapter places a detailed contrast of two regional floras—Harvard Forest in Massachusetts and Crabtree Creek in western North Carolina—in the context of a review of global plant reproductive traits. This kind of synthesis was barely envisioned a decade ago, but now provides ample directions for much new research.

The third part, “Community Dynamics across Spatial and Temporal Scales,” is similar in content to the first edition but broader in scope. A new chapter on biodiversity of southeastern forests (Robert Peet, Kyle Palmquist, and Samantha Tessel) explores the remarkably rich flora of the Carolinas, including the Blue Ridge Mountains, the Piedmont, and the Coastal Plain. New data are presented and synthesized, and the previously little-appreciated relationship between base-cation availability and species richness is elucidated and discussed. Of the remaining five chapters in this section, Robert Peet revised and updated another chapter on the North Carolina Piedmont (co-authored only by Norman Christensen and Frank Gilliam in the first edition), adding substantial data from his long-term plot studies. Similarly, Nicole Fenton was added to the group of authors focusing on the understory in boreal forests of Quebec (Louis De Grandpré et al.), which brought in new discussion of succession in *Picea mariana*-feathermoss assemblages as well as effects of forest clear-cuts on understory diversity. Of the remaining three chapters, the ones by Brian McCarthy on old-growth

deciduous forests and Susan Beatty on habitat heterogeneity were not updated at all. This is unfortunate, as their chapters discussed long-term studies, and it would have been interesting to know how these studies had unfolded over the last decade.

The final part, on “Community Dynamics and the Role of Disturbance,” is the most rewarding. The first edition had but three chapters, whereas the second edition has nine. The six new chapters cover effects of deer (chapters by Donald Waller, and by Walter Carson, Alejandro Royo, and Chris Peterson); clear-cutting in the southern Appalachians (Julie Wyatt and Miles Silman); legacies of past agricultural practices (Kathryn Flinn); nitrogen deposition (Frank Gilliam); and climate change (Jesse Bellemare and David Moeller). Every one of these chapters presents new data, is well written, and provides many open questions for future research. This final part has also been reorganized. Mark Roberts and Frank Gilliam’s review of disturbance effects has been moved to the beginning of the group of chapters, followed by Lisa George and Fakhri Bazzaz’s chapter on environmental filters, and then James Luken’s chapter on invasions and nonnative species. Of these three original chapters, Roberts and Gilliam updated their references and added a new conceptual model of understory dynamics in response to disturbance; and Luken reinterpreted his material in light of the last decade’s explosion of ideas and data on non-native and invasive species (surprisingly, however, earthworms are not mentioned at all, here or anywhere else in the book). George, however, did not update her chapter at all; in this and a few other chapters, cross-references to other chapters unfortunately were not updated by the editors to reflect the new edition’s expanded scope and re-ordered material.

Overall, the second edition of *The Herbaceous Layer* is much more than a corrected and lightly updated version of the first edition. The new chapters bring into sharp focus the importance of disturbance, conservation, and protection of forests and forest understories in states ranging from recovering clear-cuts to old-growth stands. The literature reviews and integrated bibliography are incredibly thorough and provide a one-stop shop for students beginning studies of the forest understory, for experienced researchers in need of a refresher, and for all, a reminder of the importance, the value, and the aesthetic beauty of the herbaceous layer.

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