

Book Review

Sequoia Ecology: Fire and Reproduction

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Sequoia Ecology: Fire and Reproduction, by H. Thomas Harvey, Howard S. Shellhammer and Ronald E. Stecker. 1980 U.S. Department of Interior, National Park Service, Washington, D.C. 182 pages.

This book is the twelfth volume to be published in the National Park Service's Scientific Monograph Series. It represents the product of over 12 years of scientific investigation into the role of fire, insects and small mammals in the reproduction and survival of the giant sequoia (*Sequoiadendron giganteum*). The giant sequoia is a relict species now found only in isolated distinct groves on the western slope of the Sierra Nevada. It is well adapted to periodic fire



Foliage and cones of the giant sequoia. Fire, the Douglas squirrel and a cerambycid beetle and moth all contribute to successful spread of the seeds.

by means of a thick fire resistant bark, a lack of lower limbs on mature trees and the beneficial role of fire in promoting reproduction.

The authors provide considerable quantitative data on two primary reproductive strategies. In the first, periodic fire heats and opens the serotinous cones providing an abundant source of seeds. The seeds fall on mineral soil where they have an increased chance of germinating. At the same time several factors provide for nearly continuous release of lesser numbers of seeds. The Douglas squirrel, a cerambycid beetle and a moth all attack sequoia cones, partitioning the resource along a cone age axis. This causes a drying or disintegration of the cones and subsequent gradual seed release. Most such seeds fall on litter or duff on which they desiccate before germinating. Occasionally flooding or the failure of a large tree may open up a suitable mineral soil substrate to allow germination. Once germinated, sequoia seedlings still face severe stress from shade, desiccation and predation. Of course when a tree lives to several thousand years in age it does not need to reproduce successfully very often.

Among the many interesting facts presented in this book are data on the average number of cones per tree (14,000), seeds per cone (200) and seeds produced annually per hectare (1,590,000!). Through the use of an elevator, rigged after climbing an adjacent tree, Ron Stecker was able to investigate carefully the insects utilizing the crown of a 290 foot tall sequoia. He increased the known number of insects using giant sequoias as a host during some part of their life cycle from 20 to 143.

While the book presents considerable data from detailed experiments, the data are not always easy to extract. In addition to a poor job of printing, the organization within many of the chapters could be improved considerably. Similarly the overall design of the study as well as the detailed methods are not always clear or do not always relate well to the results. The discussion sections all too often repeat the results without adequately discussing their significance. While such deficiencies could have benefited greatly from a professional editing they should not detract from the value of the data presented to park managers and interpreters.

Among their numerous conclusions the authors

emphasize the important role fire plays in perpetuating the species and the need to remove concentrated human activity from the sequoia groves.