

Restoring Diversity: Strategies for Reintroduction of Endangered Plants

Edited by D. A. Falk, C. I. Millar, and M. Olwell

A BOOK REVIEW BY JOHN T. TANACREDI, Ph.D.

As *Restoring Diversity: Strategies for Reintroduction of Endangered Plants* points out, restoration ecology is “mostly about restoring hope.” Edited by D. A. Falk, C. I. Millar, and M. Olwell, *Restoring Diversity* can help the reader to regain the rhythm of the “environmental ministry.” This book gives hope to those of us in the business of trying to reverse decades of human-induced impacts and degradation to natural systems. Though not of “biblical proportions,” *Restoring Diversity* has certainly “found me.” This publication should be “Gideonized” for all park managers.

Restoring Diversity is divided into five major divisions: (1) Policy for Reintroduction; (2) Biology of Rare Plant Reintroduction; (3) Reintroduction in a Mitigation Context; (4) Case Studies; and (5) Guidelines for Developing a Rare Plant Reintroduction Plan. The introduction defines the language of restoration, including such terms as “enhancement,” “reclamation,” “ revegetation,” “reintroduction.” Yet despite these definitions, the authors continue to emphasize that restoration is “characterized to a marvelous degree by uncertainty, risk, and unpredictability.” They do not make any apologies for what little preservation of natural systems exists today. Although heavy on “strategic” planning, the authors also provide practical applications and case studies.

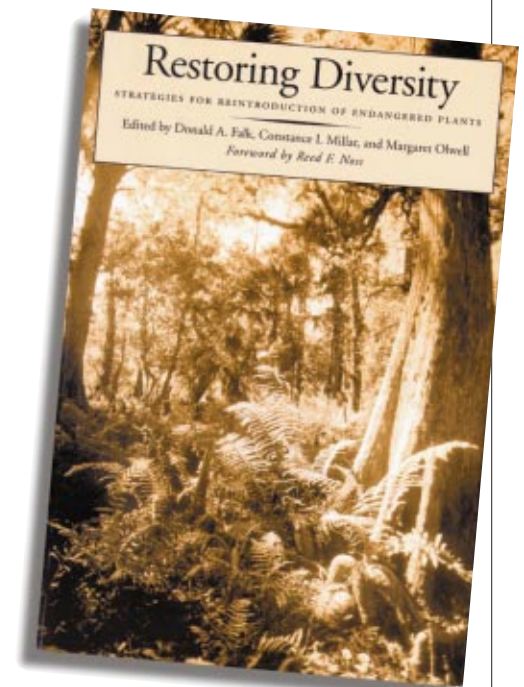
Part 1: Policy for Reintroduction

The authors of *Restoring Diversity* offer no panaceas, pointing out that “in a wounded world,” we have little choice but to intercede to halt or block wholesale eco-victimization. Even with the considerable number of laws passed with the intention of protecting and preserving natural areas in perpetuity, the loss of biological diversity continues in a rampant and insen-

sible manner. To make matters more difficult, even though there is a greater awareness and appreciation for restoration and a revitalization of “managed natural areas,” the “biological understanding for relocation or reintroducing species, populations, and communities is poorly developed.”

Chapter 1 by Larry Morse, “Plant Rarity and Endangerment in North America,” sets the tone for the remainder of the book by stating that “most reintroduction and restoration projects should be considered experimental supplements to in situ conservation.” Discussion of spatial and biological scales of reintroduction assumes that the goal of rare species is to survive rather than be made common. The book thus emphasizes the difficult management task of attention to the entire landscape, including immigration-extinction, zone flow and dispersal, pathogenic impacts, habitat influences, and biogeochemistry. If at all possible our goal should be “stability” through prevention of habitat fragmentation.

Discussions of reintroduction at a regional scale and the use of the “original” site status for rare species as the reference point for reintroduction is most applicable for the National Park Service, since the authors question “how recently must we document the original presence on a site?” The authors say that many conservationists “would probably be comfortable with 10 years rather than a scale of hundreds of years unless anthropogenic pollution or causes of extirpation heavily influence species existence at a site.” Those of us in federal service realize that we may never see such a progressive restoration program, because we continue to document rare plant species in a time frame of the annual base funding for such programs. We need to look more critically at the reintroduction of native species based on a documented existence in the past, and the



complex causative factors that were responsible for the loss of metapopulations. The authors suggest that we should not be “overly narrow [in our] definition of the site of original occurrence.” In New York City, for example, a locally rare plant (*Cyperus schweinitzii*) was found on an abandoned, concrete airfield runway that had deteriorated after 50 years of no or little use. The two small plots were isolated and fenced in. If we hadn’t inventoried the site prior to our reclamation effort (spreading wood chips and letting natural revegetation occur), we would have lost this rare plant population.

Of special interest to me were the discussions on finding single populations of rare plants, which reemphasized the desperate need for unbiased monitoring to assess conservation effort success. Inventories these days are all too often conducted for environmental impact statements by “environmental consultants, contractors, or developers,” who have a vested interest in keeping species numbers and diversity levels low, and who are certainly not interested in long-term preservation.

The chapter on regulatory policy by C. B. McDonald should be pulled out by land managers and kept near their telephones. This chapter emphasizes the Endangered Species Act (ESA) and was interestingly skewed in its discussion on permitting, pointing out that “no permits are required



under U.S. Fish and Wildlife Service implementation of the ESA for threatened and endangered (T&E) plants!" It was good to see that the policy discussion covered the intent of the ESA to protect the "ecosystems" upon which all other species depend. The rehabilitation of impacted ecosystems is the goal, not just "save the T&E species."

The Hawaiian experience with T&E species is an eye-opener. Reading this section should rekindle, or keep lit, the fire of enthusiasm and dedication to preserve wild places before they become so degraded. One interesting note was the fact that transplantation and reforestation efforts designed to reverse the widespread impact of cattle grazing and agricultural development commenced in Hawaii in 1910 and continued through 1960; however, none of the originally transplanted native populations exist today! Today, of 103 species of native Hawaiian plants that have been transplanted into wild or semiwild areas, 35 are at risk of extinction. The discussion of "genetic pollution" or hybridization is interesting and should be the topic of a future conference proceedings.

Part 2: Biology of Rare Plant Reintroduction

Though no real "success" criteria are generic enough to be used for all rare plants and their reintroduction into natural systems, figure 6.3 covering what Bruce Povlick identified in his paper as the minimum viable population is important for land managers to review. Yet, as Povlick notes, a "minimum viable population" may be extremely difficult to maintain, especially in founding populations of rare plants. Povlick's paper presents a number of excellent case studies that set the stage for further exploration of the technical challenges of plant restoration ecology. Site introduction selection processes and population genetics with a horticultural perspective are covered by two well-referenced papers.

Richard Primacks' paper on the use of ecological knowledge to assist in reintroduction efforts emphasizes meeting all ecological requirements in order to provide a greater chance of success, measured by population dispersal beyond the reintro-

duction site and the "establishment of a dynamic metapopulation." Park natural resource management staff should use this paper as an introduction to the key elements that need to be identified before attempting to introduce rare plants. The intensity of such an effort will be daunting and should be acknowledged in advance by management so that appropriate resources can be made available. R. D. Sutter's paper reinforces this with his chapter on "Monitoring." He states succinctly that "if reintroduction is to be meaningful in the long term, its proponents and practitioners must acknowledge that design and planting are but the first steps in a commitment that extends for many years." Monitoring restoration and reintroduction efforts is the principle "feedback" mechanism to guide future efforts, to establish "success," and to provide input to bolster the scientific effort.

Part 3: Reintroduction in a Mitigation Context

As the editors note, "the most controversial application of reintroduction and restoration" is when it is required or recommended as mitigation of some regulatory or developmental actions. I am sure all NPS superintendents have experienced a wide range of proposals purportedly being "mitigatable" through the environmental assessment and analysis process. Few of these projects are ever monitored to see if the mitigation actually worked.

Ken Berg introduces us to the definitions of mitigation and A. H. Howald reveals the complexity of actions necessary in the "California Experience," revealing pitfalls and anticipated costs and presenting site case studies. I. B. Zeller's paper on created wetlands in California is directly applicable to east coast tidal marshes, and the lessons learned from fertilization requirements, altered predator population dynamics,

canopy development, and overall marsh functioning were most informative. Chapters on the "Use of Corporate Lands" in preserving plant biodiversity, and new directions for rare plant mitigation policy present several interesting approaches to protecting rare plant species. A final chapter in this section, "FOCUS: Rare Plant Mitigation In Florida," is an excellent segue into Part 4: Case Studies.

Part 4 presents a number of practical examples of rare plant reintroduction projects with their "re-introduction history." Examples of different taxa are provided. Each case includes information on threats to the population, endangerment status, site re-

quirements, and reintroduction conditions. Even funding levels are provided to help sort out applicability to your individual needs. The book concludes with Part 5, "Guidelines for Developing a Rare Plant Reintroduction Plan," which could be used to help justify the implementation of a rare plant reintroduction program in any national park unit.

This is an excellent work that should help provide a foundation in the practice of restoration of natural systems. I recommend that all

natural resources staff and superintendents in the National Park Service read it and then put into their respective libraries for future reference. **P**

References

Stalter, R., M.D. Byer, and J.T. Tanacredi. 1995. Rare and endangered plants at Gateway National Recreation Area: A case for protection of urban natural areas. *Landscape and Urban Planning* 35:41-51.

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