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WHAT SHOULD CONSERVATION BIOLOGY CONSERVE?

Nielsen, Jennifer L. (ed.). 1995. **Evolution and the aquatic ecosystem: defining unique units in population conservation.** American Fisheries Society Symposium 17. American Fisheries Society, Bethesda, Maryland. xii + 435 p. $69.00, ISBN: 0-913235-94-6 (acid-free paper).

As governments throughout the world establish laws contributing to the conservation of biodiversity, they must also decide what to conserve. The U.S. Endangered Species Act (ESA), one of the most powerful and far-reaching environmental laws in the world, allows not only for listing of taxonomic species but also "any distinct population segment" of a vertebrate species (1978 amendment). By using this language, biological units below the subspecies level become eligible for ESA protection. However, vague terms hinder conservation efforts by making them arbitrary or stalled. What exactly is a "distinct population segment," how is it recognized and what is its value in conservation?

The purpose of this book is to present the opinions and findings of many important scientists and administrators on the concept of "distinct population segment" and on the value and feasibility of defining units smaller than species for the purpose of conservation. This volume contains the proceedings of a 1994 symposium held in Monterey, California entitled "Evolution and the Aquatic Ecosystem: Defining Unique Units in Population Conservation." The symposium was organized and the book effectively edited by Jennifer Nielsen, with the support of the American Fisheries Society. While this publication achieves its objective, it lacks synthesis and provides for ongoing debate rather than a set of recommendations.

The book is divided into six parts. Part One sets the theme of the book by focusing on the Evolutionarily Significant Unit (ESU), a concept introduced by the National Marine Fisheries Service (NMFS) in 1991 for identification of distinct population segments in Pacific salmon. An ESU is a population (or group of populations) that (1) is substantially reproductively isolated from other conspecific population units, and (2) represents an important component in the evolutionary legacy of the species. Defining what is meant by "substantial" and "important" and many other such aspects of the concept have been greatly debated since its introduction. R. Waples of the NMFS provides an extensive and valuable description of the ESU concept, reviews its success with salmon, and responds to criticisms. His paper is preceded by one on conservation ethics favoring the ESU concept, but followed by one with an ecological focus that recommends abandoning the ESU approach. Thus, controversy is already re-established.

Part Two focuses largely on genetic and phylogenetic approaches to understanding population structure and the ESU. Several papers argue that species are lineages and that derived character states are necessary to identify units of biodiversity. A particularly extensive work by R. Mayden and R. Wood could easily serve as a "primer" on phylogenetic systematics. Part Three deals with behavior and life history with several papers emphasizing how behavioral studies should be integrated with morphological, life history, and genetic studies to determine the specific status and relationships within and among ESU's. The concern is that the use of phenetic genetic analyses alone may not appropriately identify reproductive isolation and thus the ESU. Part Four returns again to genetics and points out how lack of progress in understanding the adaptive significance of genetic variation prevents an adequate understanding of ESU's. J. Hard proposes that the major problem with molecular approaches is that conservation units may be identified without seriously addressing whether these units represent adaptive variation, and he suggests an emphasis on quantitative genetics. Part Five addresses ecosystems and habitats, and how the ESU concept may overlook biotic integrity as an important component of conservation biology. Perhaps individual habitats are ESU's because they provide the basis for ecological and evolutionary processes. Several authors propose that conserving biodiversity will depend on defining units at different levels of biological organization, or perhaps replacing the ESA with an ecosystem-based biodiversity policy. The final section of the book includes position papers from five government agencies which help put the academic work in the preceding sections into a practical perspective.

The divergent opinions and the lack of a synthesis in this book are perhaps not surprising given the complexity of the issues faced by the symposium and the fact that conservation biology is still a budding science. However, the absence of final recommendations is an important message to the reader. Clearly, scientists and administrators disagree about the meaning, value, and feasibility of defining population segments for conservation. This disagreement suggests that the terminology and perhaps policy of the ESA is problematic. Not only does the imprecise language engender debate without solution, but the resulting confusion impedes progress and possibly diverts attention from more appropriate conservation practices. Many of the debates in this book reflect the significant differences between what I call bottom-up (genes and species) and top-down (landscapes and ecosystems) conservation legislation. The ESA anchors conservation to a bottom-up approach while many biologists would prefer it the other way.

This book is the only reference available with a diverse set of information addressing the issue of distinct population segments in conservation biology. Despite its weakness in not providing a synthesis, it has much to offer conservation biologists and policy makers and will contribute to the ongoing debate about what conservation biology should conserve. The Canadian Endangered Species Protection Act (Bill C-65) is presently before the House of Commons for its second reading. It defines species as: "species, subspecies, or geographically or genetically distinct populations of animal, plant or other organism that is wild by nature." Once again, the terms are vague, thus ensuring that the debate continues on this side of the border. This book should be a help.

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