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Metapopulations and the Real World

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Metapopulations and Wildlife Conservation. Dale R. McCullough, editor. 1996. Island Press. Washington, DC. 429 pages. $55.00 (cloth), $28.00 (paper).

Metapopulations are currently a hot topic in ecological theory and conservation biology. Fundamentally, a metapopulation is a population of populations, and the term describes certain populations that inhabit discrete habitat patches. Individuals move between patches often enough to recolonize extirpated patches, but not so frequently that the patches exhibit similar population trajectories. The term "metapopulation" was coined and a theory formalized by Richard Levins in 1969, but the concept of spatially divided populations has been around for a longer time.

Metapopulation theory is tightly connected with many other modern ecological concepts, such as island biogeography, spatially structured populations, issues of spatial scale, and landscape ecology. The theory is critical to ideas in conservation biology involving reserve design, source and sink habitats, and population viability analysis. Most critically, as humans not only reduce the areal extent of natural habitats but also fragment the remaining parcels, once-continuous populations become increasingly isolated; they may become metapopulations, elevating the relevance of the theory.

This volume arose from a symposium held in 1994. McCullough brought together some individuals to present the theory cogently, as well as some to describe case studies based on application of the theory to real problems. Four chapters lay the theoretical foundations. Following the editor's Introduction, Michael Gilpin explains spatially structured population-dynamics models. Philip W. Kedrick next discusses the importance of genetics to metapopulation theory. John Wiens then provides a context for thinking about how the theory can be applied to conservation issues: what are the important assumptions and how can they be met? In the final background chapter, William Z. Lidicker, Jr., and Walter D. Koenig review the behavioral responses of terrestrial vertebrates to habitat edges and corridors, essential considerations if metapopulation theory is invoked.

The remaining chapters present case histories of applications of the theory to specific animals, usually rare or endangered species. Included are one amphibian (pool frog), two bird species (spotted owl with two chapters and Florida scrub jay), and seven mammals (Stephen's kangaroo rat, Mediterranean monk seal, Steller sea lion, cougar, grizzly bear, mountain sheep, and tule elk). Absent are any examples of invertebrates, despite the excellent work that has been done with butterflies. The examples nicely illustrate how the theory may hold, which data are essential, and what lessons may be learned by applying the theory. Some examples provide actual

recommendations for management; others are preliminary and discuss the metapopulation concept and how it might be brought to bear on the species under consideration. Like other forms of modeling, metapopulation theory provides a useful way of looking at problems, but its results are no more trustworthy than the data and assumptions on which it is based.

Overall, this edited volume offers a useful introduction to the theory and, equally importantly, valuable experience about how it might be applied.--*Douglas H. Johnson, Northern Prairie Science Center, U.S. Geological Survey-Biological Resources Division, Jamestown, ND 58401.*