Allee Effects in Ecology and Conservation: F. Courchamp, L. Berec, and J. Gascoigne. Oxford University Press, Oxford (2008). ISBN 978-0-19857030-1, (hardcover), 256 pages. Price: $90.00.[1]

Populations don't grow without bounds: density-dependent regulation stops population growth when population size is too large. This concept of negative density dependence of population growth has been a central idea since the origins of population biology. Simply put, it means that the rate of population growth should decrease as population density (or size) increases because of increased competition, predation or parasitism, preventing the population from growing indefinitely.

The historical focus on antagonistic interactions as the force behind population regulation at high densities has led to overlooking another important type of density dependent population regulation: positive density dependence, or the Allee effect. Named after pioneering ecologist Warder Clyde Allee, who originally conceived this process and provided the first experimental evidence for it, the Allee effect refers to the increase in population growth rate as populations grow at low densities. Although W. C. Allee published his first contributions to the topic in the 1930s, it took several decades for ecologists to recognize and accept the broad ecological significance of the Allee effect.

A symptom of the slow acceptance of positive density dependence as an important mechanism for population regulation is the scarcity of book-length treatments of the Allee effect. Although there have been several review articles on the Allee effect (e.g., Courchamp et al., 1999; Stephens and Sutherland, 1999), until recently there had been no books devoted entirely to the topic. With the publication of Allee Effects in Ecology and Conservation, Frank Courchamp, Luděk Berec and Joanna Gascoigne have done the job, and they have done it superbly well.

The book, written in an engaging, relaxed style, is profusely illustrated by an impressive battery of tables, figures and photographs. It starts by providing a definition of the Allee effect and its historical context. We can learn, for instance, how W. C. Allee's upbringing in a Quaker community (the “society of friends”) may have contributed to his conception of cooperation as an important ecological interaction besides competition. The authors then provide a catalogue of the multiple mechanisms that may give rise to Allee effects, exemplified by a diverse collection of case studies. What I found particularly useful is the emphasis on the distinction between component and demographic Allee effects: the former occur at the level of individual fitness, while the latter occur at the level of mean (population-level) fitness, thus determining the population growth rate. The important point here is that component Allee effects do not necessarily lead to demographic Allee effects. Another important point is that Allee effects may result not only from ecological but also from genetic and evolutionary mechanisms, an issue that has received relatively little attention compared to ecological mechanisms. Courchamp, Berec and Gascoigne again impress us by devoting an entire chapter to the topic.

Of course, incorporating Allee effects into ecological thinking necessarily means revising classic population models that assume only negative density dependence. Courchamp et al. offer a whole chapter on modelling the Allee effect, with a broad overview ranging from simple phenomenological models to mechanistic ones incorporating specific component Allee effects. Having all the math in a single chapter is

1 Article in press in *Biological Conservation*, http://www.sciencedirect.com/science/journal/00063207

helpful as a stand-alone compendium, and it also makes the book friendlier for the less mathematically inclined readers (who might simply skip the chapter and move on to the next one). But at the same time this approach may hamper the otherwise excellent book-wide integration of information, forcing the reader to go back and forth between chapters to look into the math behind the concepts.

Perhaps the most appealing aspect of the book for the readers of Biological Conservation is the space devoted to the importance of Allee effects for applied conservation and management problems. Courchamp, Berec and Gascoigne discuss the mechanisms, the evidence for the occurrence and the detection of Allee effects in the context of habitat loss and fragmentation, introductions and reintroductions, ex-situ conservation, and in the management of exploited populations and alien species. I found this review a very useful summary of the literature. Perhaps, however, some readers looking for practical solutions for specific problems may be disappointed, as this is not a handbook for dealing with Allee effects but a summary of a vast and growing literature on the subject.

All in all, I believe Allee Effects in Ecology and Conservation is a landmark contribution to the ecological and conservation literature. The book seems ideal for graduate seminars, and as required reading for any ecologist and conservation biologist.

References

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