

MODELING POPULATIONS OF ADAPTIVE INDIVIDUALS.
Monographs in Population Biology, Volume 63.

By Steven F. Railsback and Bret C. Harvey. Princeton (New Jersey): Princeton University Press. \$105.00 (hardcopy); \$40.00 (paper). xvii + 173 p.; ill.; index. ISBN: 9780691180496 (hc); 9780691195285 (pb); 9780691195377 (eb). 2020.

Arguably, much of ecology is premised on the fact that adaptive individual behavior scales in such a way that population-level patterns emerge as a consequence. However, a unified modeling approach that translates these scales is not straightforward. Such an interscale enterprise is exactly the goal that Railsback and Harvey wish to tackle in this volume, in which they outline their solution to rectify the scale differences in behavioral decisions and population-level responses that they term state- and prediction-based theory (SPT).

The first section of the book establishes the rationale and justification for the SPT approach, which is, in many ways, the fruitful and natural union of techniques employed in Dynamics State Variable Models (DSVM) and Individual-Based Models (IBM). At its essence, SPT is an approach to modeling that embeds an individual's constrained optimal decision-making into an IBM, allowing users to scale up to emergent population-level (or higher) patterns. By constraining the decision to be the best out of more limited set of options, the decisions of an individual become tractable and efficient within the context of an IBM. This trick sidesteps the need to represent omniscient individuals that typically limits DSVM to relatively simple situations with strong assumptions (with notable exceptions), potentially precluding their full implementation within an IBM.

Through a series of well-laid-out case studies in the second section of the book, Railsback and Harvey have taken great pains to show that the SPT approach with its constrained optimal decisions can faithfully reproduce the patterns of a DSVM within the IBM context. It is clear that the authors bring a wealth of experience in creating and applying these models to their favorite empirical systems. The ability to move seamlessly from the details of the models to the biology that it represents is important for cementing the credibility of the models, the SPT approach, and the modelers themselves. At times I wished to have a flow diagram or piece of pseudocode to orient me to the actual model used in the case study, however, the companion site for the volume did provide the working (NetLogo) code for all of the examples. Not only did the examples build the case for the SPT approach, but also provided a common experience for the authors to refer to in the next section of the book.

The last section of the volume is dedicated to the SPT modeling process and is a valuable resource

based on years of experience applying SPT, and modeling in general. Although the authors advocate linking SPT models to empirical studies and management applications, their technique also allows for the investigation of general and theoretical patterns. This book is a great resource for anyone interested in incorporating tradeoffs and adaptive behavior into IBMs and, in particular, a guide to constructing and employing models that will be appreciated by newer modelers. Railsback and Harvey's volume is a welcome addition to the esteemed *Monographs in Population Biology* series from Princeton University Press.

DARCY VISSCHER, *Biology, King's University, Edmonton, Alberta, Canada*

TOWNS, ECOLOGY, AND THE LAND.

By Richard T. T. Forman. Cambridge and New York: Cambridge University Press. \$99.99 (hardcover); \$51.99 (paper). xviii + 585 p. + 32 pl.; ill.; index. ISBN: 978-1-107-19913-2 (hc); 978-1-316-64860-5 (pb). 2019.

This volume fills the gap between books on urban ecology oriented toward densely developed cities and those on human impacts on agricultural and natural areas. Forman focuses on the understudied population centers housing 200 to 30,000 residents. As he notes, however, the transition from a town to a small city varies from 5000 to 10,000 inhabitants in some developing nations to 100,000 in China. Although a majority of examples are from the United States and Europe, the coverage is international in scope, drawing on studies from the arctic to equatorial regions, and from squatters' villages to fishing communities to gated suburbs. Topics incorporate towns in agricultural, forest, and arid landscape matrices, and town effects relative to watersheds, bodies of water, and wetlands. The volume covers a full inventory of environmental planning concerns such as soil compaction, waste disposal, heat islands, and impervious surfaces. Comparisons among human settlements consistently point out differences between villages, towns, and cities, such as the density and diversity of trees and the ratio of native species to imported cultivars.

Towns, Ecology, and the Land outlines the functions of buildings, dumps, powerline right of ways, and lawn trees as unique wildlife habitats. The author provides detailed discussions of topics such as the impact of dog walking and dog waste, and the determinants of cat density, food, home range, and predation pressures on rare native species. The volume is attentive to ecological dimensions, microhabitats, and scales for flora, and examines local dynamics such as the arrival of neophytes in villages and the species compositions of cemeteries. It considers critical