

Contents

Part I Individual Animal Movement

Stochastic Optimal Foraging Theory	3
Frederic Bartumeus, Ernesto P. Raposo, Gandhi M. Viswanathan, and Marcos G.E. da Luz	
Lévy or Not? Analysing Positional Data from Animal Movement Paths	33
Michael J. Plank, Marie Auger-Méthé, and Edward A. Codling	
Beyond Optimal Searching: Recent Developments in the Modelling of Animal Movement Patterns as Lévy Walks	53
Andy Reynolds	

Part II From Individuals to Populations

The Mathematical Analysis of Biological Aggregation and Dispersal: Progress, Problems and Perspectives	79
Hans G. Othmer and Chuan Xue	
Hybrid Modelling of Individual Movement and Collective Behaviour	129
Benjamin Franz and Radek Erban	
From Individual Movement Rules to Population Level Patterns: The Case of Central-Place Foragers	159
Hsin-Hua Wei and Frithjof Lutscher	
Transport and Anisotropic Diffusion Models for Movement in Oriented Habitats	177
Thomas Hillen and Kevin J. Painter	

Incorporating Complex Foraging of Zooplankton in Models: Role of Micro- and Mesoscale Processes in Macroscale Patterns	223
Andrew Yu. Morozov	

Part III Populations, Communities and Ecosystems

Life on the Move: Modeling the Effects of Climate-Driven Range Shifts with Integrodifference Equations	263
Ying Zhou and Mark Kot	

Control of Competitive Bioinvasion	293
Horst Malchow, Alex James, and Richard Brown	

Destruction and Diversity: Effects of Habitat Loss on Ecological Communities	307
Nick F. Britton	

Emergence and Propagation of Patterns in Nonlocal Reaction-Diffusion Equations Arising in the Theory of Speciation	331
Vitaly Volpert and Vitali Vougalter	

Numerical Study of Pest Population Size at Various Diffusion Rates	355
Natalia Petrovskaya, Nina Embleton, and Sergei V. Petrovskii	