Table 1. Broad areas of ecological theory that are foundational to the science of restoration ecology and are covered in the book. For each, examples of current issues and relevance to restoration are provided.

Relevant ecological theory	Ecological restoration questions	Examples of current themes, issues, and models	Contributors
Population and ecological genetics	**Which propagule sources and numbers should be introduced?**	Bottlenecks and founder events, drift in small populations, locally adapted genotypes, within- and among-population genetic diversity, inbreeding and outbreeding effects, genetic neighborhoods and spatial genetics, effective population size, gene flow	Falk, Richards, Montalvo, and Knapp *(Chapter2)*
Ecophysiological and functional ecology	**What are the potential physiological challenges in the restored environment?**	Stress tolerance, physiological limits of survival and reproduction, adaptation to novel environments, phenotypes tolerant of unusual conditions	Ehleringer and Sandquist *(Chapter 3)*
Demography, population dynamics,	**How can we tell if populations will persist?**	Population dynamics, demographic transition matrices, seed dormancy and germination, population persistence and resilience, population spatial structure, age structure and density	Maschinski *(Chapter 4)*

metapopulation ecology		dependence, dispersal among sub-populations, metapopulation dynamics	
Community ecology	**What assemblages will persist in each part of the site? In what order should they be introduced?**	Community composition, coexistence of species, assembly theory, alternative successional pathways, sensitivity to initial conditions, predation, trophic structure, dispersal, environmental filters, disturbance regimes, mutualism	Menninger and Palmer (*Chapter 5*)
Evolutionary ecology	**How will organisms adapt to potentially novel restored environments?**	Evolutionary environment, adaptation to novel environments, trait selection, metapopulations, genetic diversity, evolutionary potential, landscape genetics	Stockwell, Kinnison, and Hendry (*Chapter 6*)
Fine-scale heterogeneity	**How can sites be modified to enhance diversity?**	Spatial heterogeneity of resources and ecosystem functionality, spatial and temporal variation at plant/individual animal and community, co-existence of multiple species at multiple spatial scales	Larkin, Vivian-Smith and Zedler *(Chapter 7)*

Food webs	**Do interacting species need to be introduced?**	Trophic cascades, bottom-up / top-down dynamics, food web networks, productivity – food web structure, plant-herbivore interactions, predator-prey theory, indirect interactions	Vander Zanden, Olden, and Gratton, (*Chapter 8)*
Ecological dynamics and trajectories	**How will the restored system develop?**	Trajectories of ecosystem degradation and recovery, natural variability, linear and nonlinear dynamics, multiple stable states *vs.* ordered succession, resilience, multiple equilibria, ecological thresholds	Suding and Gross *(Chapter 9)*
Biodiversity and ecosystem functioning	**Can a single restoration site maximize species richness and ecosystem functions?**	Diversity-stability relationships, functional diversity, functional equivalence, redundancy, interface between community and ecosystem ecology, ecological insurance and ecosystem reliability	Naeem (*Chapter 10*)
Invasive species and community invasibility	**How should sites be managed to exclude undesired species?**	Properties of invasive species, community invasibility, alteration of ecosystem processes, plant community responses, resistance and resilience, competition, top-down and bottom-up control,	D'Antonio and Chambers *(Chapter 12)*

		disturbance theory	
Modeling and simulations	**How predictable are restoration outcomes?**	Stochastic influences on deterministic processes, uncertainty, natural range of variability, spatial interactions, heuristic and simulation models, multivariate statistics	Urban (*Chapter 11*)
Research design and statistical analysis	**How can we design restoration experiments and analyze the resulting data?**	Replication, power analysis, sample size, general statistical framework, time series and repeated measures, chronosequence analysis, multivariate characterization, estimating effect size, BACI designs	Osenberg, Bolker, White, St. Mary, & Shima *(Chapter 13)*
Macroecology	**How does the larger spatial context influence an individual restored site?**	Large scale ecological processes, species and population migrations over time and space, ecosystem size and community diversity/structure, cross-system fluxes	Maurer (Chapter14)
Paleoecology, climate-change	**How can we plan for global change?**	Climatic cycles, climate-vegetation relationships and migration of vegetation, vegetation-climate (dis)equilibrium, natural variability, temporal variation	Millar and Brubaker (Chapter 15)