

# Stochastic Models in Population Biology and Demography

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**Abstract.** I will discuss stochastic models used in population biology and demography, with an emphasis on the results and open questions that matter to applications. We'll begin with scalar models of total population and then structured models that incorporate age, stage and similar variables, and the kinds of stochastic processes that are of interest. Questions of interest to biologists and demographers will be discussed. The first main topic will be extinction and first-passage problems – I will outline what is known, and discuss problems that arise with MBPRE and with models that use fractional Brownian motion drivers. The second main topic is the properties of stochastic structured models, especially the long-run growth rate which is the top Liapunov exponent. We will discuss elasticities and their use and some open problems. Depending on the time available, we may discuss also optimality problems (average reward problems) and some recent work on mutation-selection equilibria.