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Models for extinction in metapopulations

Standard metapopulation models assume a timescale separation between the local dynamics (fast), and the global dynamics, allowing for a much simpler treatment of the whole population. This assumption is however not realistic. With a Master equation we implement a metapopulation model with general within-patch dynamics. We implement a Fokker-Planck approximation, by means of expanding on the inverse number of patches, to describe the quasi-steady state and the size of typical fluctuations. We use also WKB theory in order to calculate the expected time to extinction for the population. We compare our results to numerical simulations, and lastly to the standard metapopulation model.