

Extinction of established populations: A physicist's view

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Extinction of an established population is a dramatic effect. It can result from a rare large fluctuation coming from the discreteness of individuals and stochasticity of their births, deaths and interactions. It also epitomizes the importance of rare events. Predicting the mean time to extinction accurately is important in many applications. Examples include assessment of viability of small populations, and evaluation of the lifetime of an infectious disease in a community. I will show how one can use a variant of WKB approximation, that originates in quantum mechanics and other areas of physics, to calculate the mean time to extinction of an isolated stochastic population. In this framework the most likely path of the population to extinction is described by an instanton-like trajectory of an underlying classical Hamiltonian system.