



Mathematical Biology Seminar



Monday, October 31, 2011
3 pm – 657 CAB

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Cycles in finite populations: a reproducible seminar in three acts

Many natural populations exhibit cyclic fluctuations. Explaining the underlying mechanisms of such cycles is a central problem in ecology and has preoccupied population ecologists ever since Elton's classical work in 1924. Over the years, a wide range of mathematical models have been explored in an attempt to gain understanding of the conditions giving rise to or inhibiting population cycles. Many of these models, however, rely on the assumption that population sizes are infinite, and hence implicitly assume that the effects of demographic stochasticity are negligible.

Here I will show how demographic stochasticity can give rise to regular and persistent population cycles, so called quasi-cycles, in simple finite consumer-resource models that are deterministically stable. The existence of such quasi-cycles expand the scope of population cycles caused by ecological interactions, thereby complicating the conclusive interpretation of such patterns. I will discuss how quasi-cycles dovetail with existing theory and will also illustrate the feasibility of accurately identifying such cycles by systematically applying a series of simple analyses to simulated data and data from natural populations.

I will be using this presentation to illustrate how reproducible computational science can be practiced.