Modelling growth and foraging using stochastic differential equations, with applications to recruitment in fisheries.

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Poisson processes are widely applicable to problems in ecology, particularly when modelling foraging and growth in an unpredictable environment. However, since a simple Poisson process involves a single parameter there is no scope for examining the role of variance caused, for example, by patchiness or turbulence. When the problem is reformulated as a stochastic differential equation one can apply a wide range of analytical and numerical methods to study the role of variance explicitly. This reformulation of the problem is non-trivial to implement, and care must be taken in the interpretation, at the level of the individual organism, of factors such as physiological constraints and nonlinear responses. These issues are illustrated using models of recruitment in fisheries.

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