Meeting: 1006, Lubbock, Texas, SS 9A, Special Session on Theory and Application of Stochastic Differential Equations

1006-92-86 **Brian Dennis*** (brian@uidaho.edu), Dept Fish and Wildlife Resources, University of Idaho, Moscow, ID 83844-1136. *Approximation for a stochastic logistic equation.*

The logistic population growth equation appears in virtually every ecology textbook. Yet, it has the reputation of being a "toy model" intended as a simple teaching concept, but not intended for describing real population systems. In this presentation I argue that adding one ingredient –stochasticity– transforms the model into a frequently useful data anaylsis tool.

The resulting model, of logistic growth with environmental-type noise, is a stochastic process known as a diffusion process. The concept of carrying capacity is no longer a point equilibrium but rather is a gamma probability distribution. Many statistical properties of the model can be derived as formulas. With simulations, I evaluate an approximation, based on singular perturbation, for the full time-dependent probability distribution of the process. The approximation turns out to be accurate and quite helpful for fitting the model to time series data. Various examples that use the model for statistical analysis of population time series are developed. (Received February 07, 2005)