

On the Use of Correlated Beta Random Variables with Animal Population Modelling

Carlos Tadeu dos Santos Dias¹, Ari Samaranayaka², Bryan Manly³

¹ ESALQ, University of Sao Paulo, Piracicaba, Brazil

² University of Otago, Dunedin, New Zealand

³ Western EcoSystems Technology Inc., Cheyenne, Wyoming, USA

We give reasons why demographic parameters such as survival and reproduction rates are often modelled well in stochastic population simulation using beta distributions. In practice it is frequently expected that these parameters will be correlated, for example with survival rates for all age classes tending to be high or low in the same year. We therefore discuss a method for producing correlated beta random variables by transforming correlated normal random variables, and show how it can be applied in practice by means of a simple example. We also note how the same approach can be used to produce correlated uniform, triangular, and exponential random variables.

Key Words: Correlated Non-normal Distributions; Demographic Parameters, Population Dynamics; Population Simulation