**3.1 – Introducing state-space models**

Exercise for afternoon session:

*Goal*: Students should be able to demonstrate an understanding of state-space models, and modify them to account for density dependence.

*Task:* Please develop code using R and JAGS that estimates parameters for a simple state-space population dynamics model. This involves loading data in the file “state\_space\_count\_data.csv”. Then please build a state-space model for these data. This can use code from the script “3.1 afternoon -- Introduction to state-space models.R”. However, please make two major changes to the code:

1. Use a Gompertz function for production:

where is a new parameter.

1. Use an appropriate observation equation for a count-data model:

Please check for convergence of the model, and record posterior distribution for parameter estimates.

*Optional*: Students that have time should explore the potential for spatial variation in productivity. This is easiest to include by using Latitute or Longitude as linear predictions for .

How does this affect parameter estimates?

*Interpretation*: Students should think about the following questions:

* What modifications might allow this model to better explain the available data?
* Why do I refer to the Gompertz production function as a population dynamics model? What is the per-capita productivity assumed by this model?