

Introduction to Theoretical Ecology Assignment 4

Ricker Logistic Growth Model

One unrealistic feature of the discrete logistic growth equation is that N_{t+1} will become negative when $N_t \gg K$ (you've probably saw this when playing with the shiny app). An alternative approach is to follow the Ricker logistic equation (Ricker, 1952), a well-known model in fisheries:

$$N_{t+1} = N_t e^{r \left(1 - \frac{N_t}{K} \right)}$$

1. Show analytically the equilibrium points and determine their stability criteria. Compare the stability criteria of this model to those of the standard discrete logistic model. (6 pts)
2. Plot the population trajectories under two growth scenarios $r = 0.5$, $r = 1.5$, and $r = 2.7$ ($N_0 = 10$, $K = 500$, 100 time steps for each simulation). Please include the R code you used to generate the results. (4 pts)