

Population ecology assignment: Population structure

Due at 4 PM on Fri 3 Mar

1. A population of elk has $\mathcal{R} = 1.8$ and $\lambda = 1.2$ at its stable age distribution. 40% of individuals counted at age 1 survive to age 2.

a. What is the ratio between the number of individuals born in year x to year $x + 1$ if the age distribution is stable?

b. What is the ratio between the population of age class 1 and age class 2 in the stable age distribution?

2. A scientist studies a population of mice. She finds that they reproduce once a year, that a reproducing one-year old female produces (on average) 1 female offspring who survives to reproduce, and that a reproducing two-year old female produces (on average) 3 female offspring who survive to reproduce. She also finds that 40% of females survive from the first to the second year and no individuals survive beyond this.

a. Make a life table for this population. Should you count before reproduction or after?

b. What is the reproductive number \mathcal{R} for this population?

c. What do you *guess* would be the stable finite growth rate λ for this population?

d. Use the equation $\sum_x \ell_x f_x \lambda^{-x} = 1$ from class to calculate λ for this population. We haven't reviewed this and won't test it, but it's a useful exercise. You can solve, or start from a guess and work it out numerically (2 decimal places is fine).