Day 33: Population ecology (exponential & logistic model)

Exponential model

1. Imagine a population of salmon that starts with 1000 individuals. Assume the population is following the exponential model.
    a. There are 50 fry produced per 1000 salmon. What is the birth rate?

    b. 30 of 1000 salmon die each time period. Calculate the death rate.

    c. Calculate r.

    d. How many new salmon will be added to the population in one time step (i.e., what is $\Delta N/\Delta t$)?

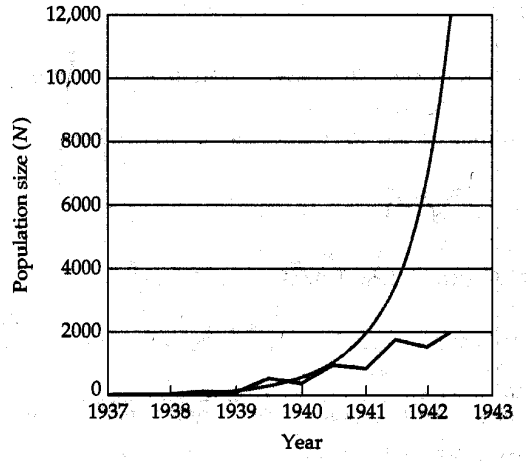
    e. The total number of salmon in any time step = old N + new N = N + rN. How many salmon will there be at time 2?

2. **Practice exam question**. A population of 100 individuals has a birth rate of 0.8 and a death rate of 0.9.
    a. What is r_{inst}?

    b. How many individuals would be added to (or subtracted from) the population in one time step (i.e., what is dN/dt)?

    c. How big would the population be after one time step (what is the new N)?

Logistic model



Pheasants on Protection Island

Identify at least 2 reasons reality might not match the prediction in this example.

Logistic model

1. Consider a population with a carrying capacity of 2000 and r_{max} = 1.0.
   a) **Practice exam Q:** In words, what is the carrying capacity of a population?

   b) **Practice exam Q**: What is the population growth rate (dN/dt) when N = 1000?

   c) Calculate the actual per-capita rate of increase for your assigned population size(s). Enter your results into the table below & share with Prof. Halpern.
   d) Sketch these data on the axes below.

N	$\frac{K-N}{K}$	Per capita rate of increase $r_{max}\left(\frac{K-N}{K}\right)$
0		
100		
200		
600		
1000		
1500		
2000		
2500