Population ecology worksheet 1: Introductory concepts

Finish by Mon 27 Jan at 4:00 PM; you don't actually need to turn it in to anyone, this is for practice.

Some of these are intentionally tricky, so it's probably OK if you're confused. Use the opportunity to try to get the ideas straight in your head.

1. A population is growing geometrically, according to the equation $N_T = N_0 \lambda^T$. Describe the behaviour of the population in the following cases:

a. $\lambda > 1$

b. $0 < \lambda < 1$

c. $\lambda < 0$

d. Choose *two* of these three cases. For each, pick parameters for the dandelion spreadsheet to give you λ in the right range, and make a graph on the spreadsheet that shows the population doing what you say.

2. A population is growing exponentially, according to the equation $N(t) = N(0) \exp(rt)$. Describe the behaviour of the population in the following cases:

a. $r < 0$

b. $r > 0$

c. $r > 1$

3. If Niagara Falls moves backward by 6cm/month, how many years will it take to move 1km? Use this question to practice cancelling units.

4. A population of bacteria is growing exponentially at the rate 0.7/day. How long will it take its density to increase from 20/ml to 100/ml?

5. The state of Wisconsin specifies that gypsy moth control efforts will be implemented in an area when the estimated density of pupae reaches 100/ha. If the estimated 2015 density in a particular county was 10/ha, and each year each adult female lays 600 eggs, of which (on average) 1/400 survive to become an adult female, in what year do you expect the province to begin control efforts in that county?