

Study Questions for Demographic Simulator

Conservation Biology
Spring 2011

Feel free to try these with one other student.

This and the simulator were updated on 3/27/2011

The simulator is presently set to have a lambda of just slightly greater than 1 (once enough generations allow it to settle down). This is graphed on the "lambda graph." The entire population is modeled on the graph labeled "N" and the size of various cohorts is given on the final graph.

At the top of the spreadsheet model there are a set of alternative b_x values.

- Try them by substituting them into the birth rate of the first matrix, immediately below.
- They will be copied into all of the other matrices from then on (the assumption being that those rates will hold constant for 160 time cycles).
- It is best to copy the entire row of birth rates at one time.
- I also suggest that when you try other rate alterations you first copy one of the pattern "alternative" birth rate rows to the blank space below the others, make what alterations you wish and then copy and paste the entire result into the first matrix and look at the results.

There is a goof sheet attached that you can copy back on the original sheet if you manage to delete a formula. Alternately, just download the spreadsheet again and start over.

Some things to try.

1. Try the alternative birth rates. Then try altering the rates and see the effect on lambda. Does the behavior of sheet match what you would expect of a population? Does the population quickly settle on its growth rate, λ ?
2. Do the same thing with survivorship (except note that there are no "canned" alternative survivorship rates).
- 3 What happens to population growth if you remove individuals from the most or least fecund cohorts? Does this affect lambda? Explain.
4. What matrix parameters set the ultimate or average growth rate? l_x , b_x , or age-specific N (or what mix)
5. In an iteroparous population like this one, what would you need to do the cohort vector to cause a population with a value of λ that is greater than 1.0 to go extinct? Killing or sterilizing all of them is a trivial answer – look into this a little more deeply.