APES predator-prey simulation lab part 1

Full Names:

1 Pre-Lab

1.1 Goal

The goal of this lab is to determine how predators and prey interact.

1.2 Instructions

Each simulation allows you to interact with some subset of the parameters that the simulation is using. To change a parameter, pause the simulation, change the appropriate slider(s), hit save, then hit restart sim.

2 Birthrates and max populations

Open the simulation titled "fox-hen birthrates and populations."

2.1 Before you start

Before you start playing with the values, answer the following questions:

1. There is a slider called "hen maxpop" that controls the maximum population for hens. What factors might influence this value in the real world?
2. Birth rate has different meaning for predator and prey in this simulation. Prey will reproduce with the given probability every time step. Predators will reproduce with the given probability only if they catch prey. Discuss whether these assumptions are reasonable.

2.2 Play with it!

For the rest of the lab, the "fox maxPop" option should be set to 2000 and left there unless your simulation lags or crashes. This option isn't very realistic and only exists to make the simulation usable on slow computers.

1. Run the simulation with the starting settings several times. Are the results the same each time? Given that simulations are meant to reflect reality as much as possible, is randomness in outputs a good or bad thing?

2. Set the birth rate to 0 for the fox. Describe what happens. Is this realistic?

2.3 First rate work.

Create a hypothesis for what will happen in each of the following situations, then test each hypothesis and record whether the data disproved your hypothesis. Make sure to run each simulation multiple times to ensure that your result isn't an anomaly. Values not mentioned should be returned to the starting values. If you forget them, just close and re-open the simulation.

1. Very low max hen population.

2. Very high fox birthrate.

3. Very high hen birthrate.

2.4 Second rate results

1. What do you think needs to be true for foxes to go extinct?

2. Repeatedly run the experiment with different values. Once you have collected some data, evaluate your initial hypothesis. Did the results support the hypothesis you made?

Fox and Hen Dynamics

fox birthrate	hen birthrate	hen maxpop	foxes survived (yes or no)

2.5 Third rate conclusions

What did you learn about predator prey dynamics from this lab? How might we attempt to test some of this knowledge in the real world?