POPULATION MODELS

Elephant Management Model - Part 2

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In this video, our goal is to find out what proportion of the females need to have a contraceptive in order to stabilize lambda at 1. That's the manager's goal. They want a stable population, and they need to know how many animals need to be given a contraceptive.

So let's choose cell B6 and start entering some different numbers. How about 0.2? Dropped our final lambda down a bit, but not quite far enough. How about 0.3? Hmm, not much there. How about 0.4? 0.5? You can see how this game might be played.

In our last exercise, we introduced the tool called 'Goal Seek', that allows you to find a value in a cell so that it meets and matches what your target cell is hoping to be. We're hoping to find a lambda value of 1.0 by changing the value in cell B6. Let's use Goal Seek to do that.

PAUSE the video: Use Goal Seek to find the proportion of females that need contraceptives to set lambda to 1.

We go to the Data tab, then What-If Analysis/Goal Seek. Here we're going to set the lambda cell, so we can choose cell E2. We want to set that to a value of one. And we're going to change the proportion of females that receive a contraceptive, and we press Okay. And Goal Seek finds a solution, and the solution is roughly 80 percent of the females breeding in a time step need to have a contraceptive applied.

PAUSE the video: Interpret your graph. What do you think causes the sharp increase in lambda around year 6 of the simulation?

So our final lambda under these conditions is one; that means the population size is stable and not changing. What is the final population size? Well for this set of runs, the model final population size is 4,229. That's greater than our initial population size of 3,500. Let's go ahead and graph the population, and we'll start off by selecting the years 1 through 80 down column A. Then we'll hold our Control key down and then we'll scroll over to the column where we calculate the total population size. I'm going to go back up the spreadsheet this time,

remembering that the last year of the simulation is in row 90. We're just going to be graphing these as a scatter plot, so I'll let go of my Control key, then I'll go to the Insert tab and we'll chose a scatter graph with lines and markers. Our chart is selected.

You can see that in Excel there's a new tab called Chart Tools, and this tab itself has three tabs. Here we can add our axes, labels, and other changes that need to happen. So our primary horizontal axis will be the year. Our vertical axis will be the population size. And if you ever want to change how that appears, just go back up to that, click on the axis itself, and then go back up, find that option again, and you can rotate it. We don't need to depict this series because only one series is shown. And we want to add a title, so we'll head up to the chart title, and we'll label this "Population Size of Female Elephants."

This graph is a nice way of showing how the population started at 3,500 animals. It actually increased, then it went down, then started to stabilize. We could run this model out to the year 120, if we wanted to, just to make sure that this lambda, in fact, is relatively stable. Because that's the lambda that we want to output in our output section. We want this final lambda to be the lambda that is reflected when the population has stabilized and is no longer changing from time step to time step.

Now we know what these values are, these estimates are, and how many females we would need to actually give a contraceptive to. Let's head back over to Tony, who will take us to the next step.

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