

POPULATION MODELS

Environmental Stochasticity, Macro

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Well, the question we need to ask next is: Once we have a model like this working, what can we do to present the results? Obviously we can't just present the results from one replicate. One replicate is meaningless in a stochastic model.

If these were results from an experiment and you had, say, 50 or 100 replicates, what you would probably do is calculate the mean of the results, say, the mean roc population, and then you would calculate the variance, or the amount of variability about that mean, and that is what you would present in a paper. But is that really useful to the caliph? He doesn't care what the average result might be over the next thousand years. What he's concerned about is the risk that he will lose control, or his descendants will lose control of his empire. So the average doesn't tell him anything about that.

What one wants to do instead is to question him, and the kind of question you could ask is: "If the roc population were to drop below 100, would you be able to sleep at night? If the model told you it was going to be below 100?" And maybe he'd say, "No, that would worry me." "Well, would it worry you if it dropped below 200?" What I'm searching here for is some kind of threshold, a number that means something to the caliph. And then I'm going to calculate the probability that the population will be below or above that number.

Well, how could we do that on a spreadsheet? Let's go back to our spreadsheet, and with the help of a macro, one can produce a frequency histogram.

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