Age Structure with Management Wrap Up

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What lessons have we learned about modeling from this exercise? Are there any new heuristics?

Well, for a start, we've seen some of the old heuristics in practice. We've seen 'press on, regardless' can be a really valuable heuristic. But I think there's some new ones.

The first is, when you have a problem that relates to the management of a population, develop a population model. This might sound a little bit obvious, but there's more to it than that. You don't try and answer the management problem head-on. You first make sure that you have a working model of the population. And once you have a working model of the population, you then try to use it to explore the management question rather than to answer it head-on.

So for example, if we found some other way of coming up with a number like .81, we would have lost out a lot of the other things we learned by having developed a population model.

The second point that comes up is in the way in which we dealt with the whole question of darting, and the heuristic here might be 'divide and conquer'. If you were trying to build a model that contained (a) the biology of the elephant, and (b) all the details that go with the mechanisms of darting and the darting process and how efficient and effective it is. You would have had endless arguments and got yourself lost between the two different types of models.

So we kind of cut through the Gordian Knot by not answering the management question directly, but coming up with the surrogate of saying, 'What is management really doing?' Management here is preventing females from breeding. So let's first of all figure out what proportion of females need to be prevented from breeding. Once we've done that, if necessary, we could build a completely separate model of the darting process and then modify that number in the light of the effectiveness and efficiency of darting. But separating out those two problems makes each of the problems easier to deal with.

Finally, the other lesson to be learned from this exercise is - developing a model, designing it,

parameterizing it, and putting it on a spreadsheet is a lot of work. Once you've done that, don't just run the model and come up with an answer. Do your sensitivity analysis, but also think of your model as a kind of working laboratory and say, "Once I've got this laboratory up and running, are there any other questions that I can answer with it?"

Remember how much we learned in that five-minute exercise of just saying 'how does the growth rate vary as we change the value of P?' That's a five-minute addendum to many hours of work, but it immediately clarifies the relationship between the proportion that are prevented breeding and the growth rate of the population, so that you can answer questions like, "What happens if I have a combined management strategy?"

So thinking about additional questions to ask of your new model is a very valuable thing to do.

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