ECOSYSTEM MODELS

Frame-Based, Part 2

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Recorded: 2005

Now that you have built a frame based model on a spreadsheet, I'm going to show you the same model this time implemented in a version of Visual Pascal called 'Delphi'.

Here we have the simplified version of the jack pine, white pine, spruce frame model. The input parameters are the probability of fire in spruce. Which we've put in as .5, which means fires are not being controlled. Probability of fire in jack pine, again .15, is a natural fire frequency. We've chosen the deer density to be high. And we are harvesting white pine trees when we are in the white pine frame at 120 years. We run the model. And we get the time line that we're looking for. Notice that there are little red bars which are perhaps hard to see on your screen, and those represent when fires have occurred. If we want to do another replicate, we run the model again.

Suppose we want to change the management strategy. Suppose, for example, we want to go from high deer to low deer. Click that. Run the model. And notice white pine is the top frame. And we seem to be getting more white pine my controlling the deer.

However, it's awfully difficult to compare just clicking replicates and looking at a model like this. So in practice again, one could use a model like this to explain to a group of stakeholders or to a manager what the model was doing. And then you would go into a mode of doing many replicates and collecting statistics that was less user-friendly, but gave you the information you needed in order to make a sophisticated decision.

This model has one lovely little feature. I'm going to click on one of the time steps, and what comes up is an explanation. To read it, it says, "Year 130, why did it stay in white pine?" There was no switch because rule White1 wasn't triggered in the previous decade. Rule White1 says, "If stand age is greater than harvest age, then switch to spruce."

And then we can click down here and get some more information on what causes a switch from white pine. And it says the only factor which causes a switch from white pine is a clear-cutting harvest. And this stand is too young to harvest. We are making the assumption that fires in the frame are vigorously controlled because of the commercial value of these trees.

Now, I think it's really a neat idea to try and introduce explanations into the run time of a model. Frame-based modeling provides a natural way to have that kind of conversation. Because one is at each time step asking the question either, "Why did we switch or why didn't we switch?"

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