

Lab 2: Introduction to Forest Dynamics

Introduction

One view of forest management is that it is a loop of activities, involving:

1. forecasting forest development
2. designing interventions that will alter forest dynamics to achieve a desired outcome
3. implementing interventions
4. monitoring forest development
5. repeating the sequence regularly, beginning with step 1.

In this lab we will use a simulation model called FSSIM, to explore the first two steps in this loop. Read Baskerville (Forest Dynamics—An Introduction) before beginning this lab.

Learning Objectives

Participants will be able to:

1. use a model to forecast forest development
2. use indicators of forest values to evaluate these forecasts
3. understand how forest development may be affected by (i) initial forest structure, (ii) stand development patterns, and (iii) management activities.

References

Cortex Consultants Inc. 2001. Notes on Using FSSIM. FMIBC.

Data for Lab 2

The FSSIM data files for this lab are in the *Lab 2* folder on the desktop of your computer. There are three *class* files representing three different forests: a balanced age structure (*classreg.dat*), an old age structure (*classold.dat*), and an actual age structure (*classact.dat*). These files are in ASCII (plain text) format, and can be viewed or edited with a text editor such as Notepad.

In this lab you will compare the three forests represented by the three different *class* files by running FSSIM with each of the *class* files in turn. FSSIM will always look for a file named *class.dat*, so you will have to save the *class* file you want to use under a new name, *class.dat* (from Notepad, choose **F**ile, and then, **S**ave **A**s. . . and name it *class.dat*). When you want to switch to another *class* file, open the new file, and save it as *class.dat*, replacing the previous one. Since you still have the original class file saved under its original name, you don't have to worry about saving the version called *class.dat*.

For this lab, you will use the same yield table file (*vols.dat*) for all three forests.

Portions of each *class* file are shown in a separate handout, along with histograms showing the age-class distribution for each of the three forests.

Exercises and Report

Prepare a written report in which you answer the questions below. Please keep your writing concise and in plain language. (No marks will be awarded for report weight or volume.)

1. Estimate the long-run sustained yield (LRSY) for the three forests, using the (MAI * area) approach. When you calculate LRSY, think carefully about which yield curve to use for each stand type or forest unit. How significant is LRSY?
2. Using the *class.dat* file named *classreg.dat* (remember to first rename it as *class.dat* so that FSSIM will be able to recognize it):
 - a) Describe the forest structure represented by this *class* file.
 - b) Find the maximum simulated long-term harvest level (LTHL), and compare it with LRSY. This forecast is equivalent to a *non-declining even-flow* harvest flow policy. Also try a different harvest flow policy, in which the change in harvest level between periods cannot exceed 10%.

Before beginning your simulations, carefully consider which indicators you will use to evaluate forest performance, so that you have some way of comparing management strategies in this and the remaining exercises. Explain your results in terms of forest performance.

- c) Repeat the process using the other two class files (*classold.dat* and *classact.dat*). Remember to rename each file as *class.dat* before using it.
3. Consider the mechanism by which planting affects timber supply (a landbase effect, or a yield effect?). How can planting be modelled in FSSIM?
4. Using the *balanced age structure* forest (*classreg.dat*) experiment with changing yield tables in at least two ways:
 - a) Increase the maximum volume achieved, by using the operational adjustment factor, or *oaf* (file *oaf.dat*) to proportionally increase or decrease the volume at every age.
 - b) Apply a regeneration delay (file *regen.dat*)

What were the effects of these changes on forest performance? Explain your results in each case.

Repeat the process, using the *old* and *actual* age structure forests, and compare these results with those for the *balanced* forest.

5. Discuss the following with respect to FSSIM (these are not trick questions—the answers are very simple and straightforward):
 - c) Explain how *forest structure* is defined in FSSIM.
 - d) Explain how *initial conditions* are defined in FSSIM.
 - e) Explain the *rules of change* used in FSSIM.