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Modeling with Woodstock: An Australian case study

Moira Finn

Introduction

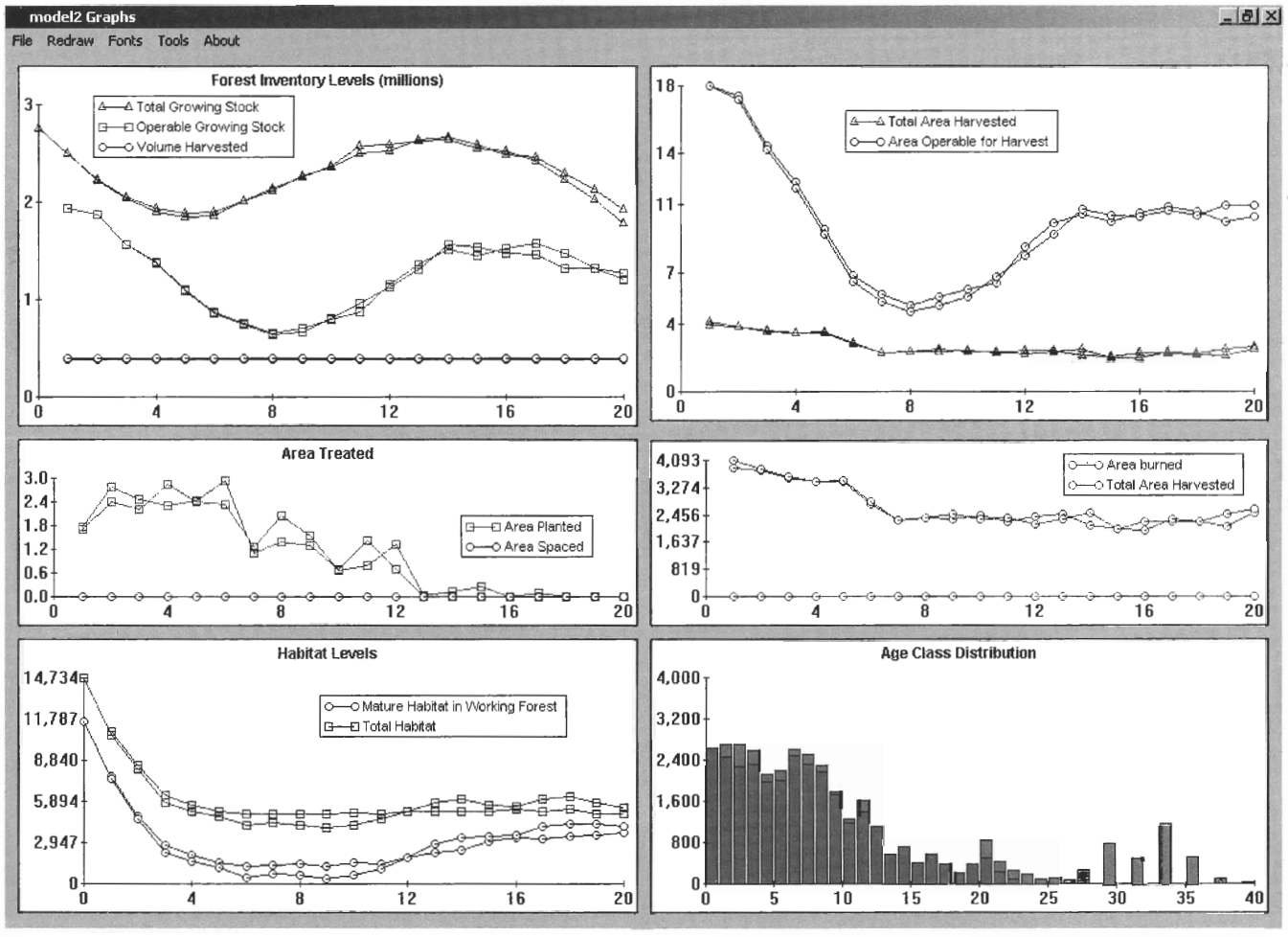
Woodstock forest modeling software, developed by Canadian company, Remsoft Inc. has gained wider recognition in New Zealand and Australia in recent years as public and private sector organizations have begun adopting the software to model estate and natural forests, and radiata pine and eucalypt species. Tasmanian forestry company, North Forest Products (NFP) has had two licenses for *Woodstock* since 1997 and uses the software to develop long-term harvest schedules for eucalypt tree farms and native forests. NFP has also put Woodstock to work optimizing the Net Present Value (NPV) of its forest estate within an overall program of sustainable management.

New applications

In 2001, NFP was purchased by Tasmania-based forest products company, Gunns Ltd. The take-over made the combined business Australia's largest exporter of wood chips, with annual sales of an estimated A$500-million.

The merger of the two large land owners also presented new opportunities for applying *Woodstock*, a Windows-based software that can accommodate simulation, linear programming (optimization) and random simulation using the same model format. The first new application was to integrate the forest records for the existing and new Gunns' businesses, and then to rebuild *Woodstock* models to incorporate the larger land base. This was

Figure 1: Woodstock syntax lets users define inputs, outputs and actions using their own terms.



possible because *Woodstock* allows users to build on existing models, adding new data and changing parameters as polices change or new information about a land base becomes available.

In addition to adding thousands of hectares of forestland to the model, NFP planners are also incorporating Gunns' business rules and strategic plans into their *Woodstock* models, including meeting specification for a new range of customers and new product lines, such as veneers. Malcolm Hatcher, NFP's Resource Information Manager, explained: "One new, key objective we have to accommodate is growing wood fiber for quality as well as for volume," citing an example of a new business rule to be built into the company's models. "This focus on high-quality pulp yield is built in to our tree breeding program, our scheduling of harvesting and our monitoring of pulpwood products. These requirements are then added to our *Woodstock* models to ensure we achieve both the required wood flows for customers and a consistent pulp yield meeting the product specifications."

NFP planners had previously used a simple Monte Carlo simulation with in-house developed programs to model its forest land, but migrated to *Woodstock* in 1997 as a number of government frameworks designed to achieve sustainable management practices were adopted by the Australian forest industry. "After visiting users in the USA and Canada, NFP chose *Woodstock* because of its flexibility. It allowed us to decide what the constraints would be and what our priorities are and it lets us change them over time as our business needs and government regulations change," Mr. Hatcher said.

Anatomy of a forest model

Woodstock forest modeling software consists of:

- A flexible modeling language for describing the forest landscape, the dynamics driving the system and actins operating on it;
- An editor that you can use to create and run your model;
- An interpreter that runs the models and produces output in the form of graphs and report files.

To build a *Woodstock* model, users need to be able to describe the landscape - that is the composition of the forest and its dynamic elements – forest classes, yield component, actions and transitions and outputs. And dynamic elements can be defined at the outset – employing the user's own terms – and additional information added later as more information becomes available.

The next step is to define activities that take place on the land, whether man-made interventions such as, silviculture, or naturally occurring activities like fire and insects. This lets users test numerous different 'what-if' type scenarios.

Because *Woodstock* also lets the user define what the model outputs will be, whether a quantity, such as harvest volume, or an economic value, the models can be customized to tell the users exactly what they want to know, instead of providing a limited set of outputs.

Remsoft. For more information about *Woodstock*, please visit www.remsoft.com or email queries to woodstock@remsoft.com.

Software Used for Forestry

Hugh Bigsby

A software use survey was again sent out with the November, 2001 issue of the Journal in order to get an idea of what software people are using in the forestry sector. There were 31 respondents to this survey, an increase from the last survey, but still only a small proportion of NZIF members or Journal readers. As such, the results cannot easily be extrapolated across all software users in New Zealand. Nonetheless, the surveys that were returned still provide some interesting observations about what is being used.

Respondents were asked to indicate the major types of forestry analysis that they were involved with. As can be seen in Table 1, most respondents were involved in some sort of financial analysis or forest valuation activity (74%). In many cases this also meant that they were also involved in plantation establishment and management (71%), or involved in wood supply analysis (42%).

Respondents were asked to identify the software that they used for particular applications. The responses are summarised in Table 2.

Respondents used 29 different types of software for forestry modelling. Inventory modelling showed the widest variation in software used (12 types), followed by financial modelling (10) and database modelling (9). GIS had the fewest types of software being used (4), largely a function of the dominance of two packages.

Table 1: Major types of forestry analysis (number of respondents).

Financial Analysis and Forest Valuation	23
Plantation Establishment and Management	22
Wood Supply Analysis	13
Forest Engineering	1
Research	2

Database modelling is dominated by generic database and spreadsheet models rather than specialized forestry packages. Microsoft Access was the most frequently used software for database modelling (54% of respondents using this package), followed by Microsoft Excel (27% of respondents). The only forestry-related database software being used is TFM (The Forest Master).

In growth and yield modelling, Forest Research's software still dominates. Of those involved in growth and yield modelling, 79% use Standpak. An interesting change from the 2000 survey is that only 21% of respondents said they were using some version of MARVL in the 2001 survey compared to 59% in the earlier survey. The same decline occurs with those involved in growth and yield modelling who use both Standpak and one of the versions of MARVL. In 2000 55% of respondents used both and in this survey only 14% used both.

Forest Research's software also dominates in inventory