Description of WOODSTOCK

Woodstock forest modeling system accommodates binary search, Monte Carlo simulation and linear programming based models within a single input file format. It is used for a wide variety of analyses; including harvest scheduling and wood supply analysis, wildlife management and simulation of forest ecosystems. The system is flexible, allowing you to create models using both simulation and linear programming (LP) formulations.

Woodstock is composed of:

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

Model Formulations

Woodstock offers you the choice of four different model formulations. Since the forest dynamic syntax is the same for all model formulations, it is quite simple to convert from one formulation to another within the same model.

- Simple inventory projection models where you set the activity levels each time;
- Binary search inventory projection models where the activity levels are varied up or down until it converges to the best solution;
- Monte Carlo simulation models that incorporate stochastic elements; and
- Generalized Model II linear programs, including mixed-integer and goal programming formulations.

Key Features

- User-defined classification schemes;
- Unlimited number of user-defined harvest, silviculture and other actions;
- Unlimited number of user-defined outputs;
- Queue actions in any order;
- User defined selection rules;
- Simultaneous control of multiple outputs;
- Age-dependent, time-dependent and complex yield curves;
- Simultaneous recognition of stands and forest-wide classes;
- Even and all-aged actions;
- Model random events;

- Model random outcomes;
- Binary search for quickly converging on maximum/minimum solutions;
- Linear programming (LP) extensions for true optimization modeling;
- Solve LP using CPLEX, LPSolve and C-WHIZ;
- Customizable reports in ASCII or WK1;
- Customizable run-time graphs; and
- Interactive and batch mode processing.

Graphics and Reports

Woodstock's reporting capabilities are extensive. All outputs defined in a model can be included in reports. They can be formatted as WK1 spreadsheet files, dBase files or ASCII text. The ASCII reports emphasize either planning periods or outputs.

Woodstock also offers a number of internal reports. These are useful for debugging models and the information they can provide includes:

- Tracing development types through actions and transitions;
- Reporting development types that are eligible (or ineligible) for particular actions; and
- Listing the selection criteria and ranking of development types for particular actions by period.

Woodstock doesn't just provide text reports on outputs - run-time color graphics are also available. Any output you have defined can be plotted in graph windows that are updated as the program executes.

What kind of modeling problems can Woodstock address?

Woodstock can address any forest management problem from vegetation succession models to economic timber supply analysis to effects of global warming on forest composition.

A few examples include:

- Timber management planning;
- Wildlife habitat;
- Economic wood supply;
- Vegetation succession in natural areas;
- Stochastic wood supply from non-industrial private forest land; and
- Virtually any silvicultural regime.

Because all actions and outputs are user-defined, Woodstock can be used to model non-timber oriented forest management problems such as fire or vegetation management plans for parks and conservation areas. The Monte Carlo simulation features are useful for evaluating stochastic variations in timber yields, for evaluating

impacts of landowner behavior on non-industrial private forestlands, or for estimating the impacts on forest structure and harvest levels in presence of fire or pest risks. Woodstock models can be very effective at spatially distributing and/or constraining outputs across the forest. In fact, Woodstock models can be fully area-based (even down to individual stands), fully stratum-based (aggregations of stand types) or some combination of the two; this makes it a simple task to track individual stands, or groups of stands where necessary. Although you cannot explicitly control harvests based on geographic location (this is done is Stanley), you can easily track where activities are taking place or, if need be, establish constraints on zones within your forest to disperse or concentrate activities. Woodstock's landscape themes correspond to GIS attribute fields and by using the same classification scheme in both the GIS database and Woodstock models, you can ensure exact correspondence between planning models and GIS data.