

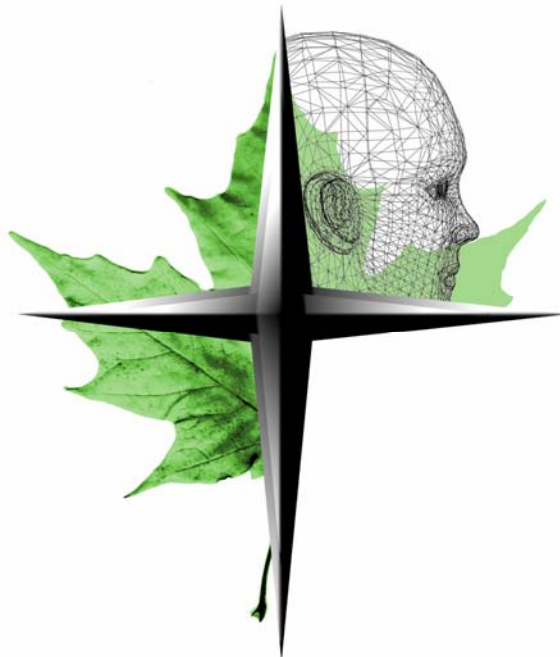
ALLOCATION OPTIMIZER

*optimizing allocation decisions
for improved profitability*

Allocation Optimizer is a powerful extension to Woodstock that allows you to build and solve complex fibre allocation problems. As an extension, it easily integrates with the Remsoft Spatial Planning System, so you can include destination, mill demands, transportation costs and product value in your strategic management plans. And you can optimally allocate your tactical and operational harvest blocks.

Benefit from the ability to schedule harvesting, processing and wood products delivery so they not only meet market demands but do so at the highest profits, lowest delivered wood costs and best overall economic results.

In this document you will find answers to common questions about the Allocation Optimizer – what it is, why it might be of value to you, and what is involved in implementing it.



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INTRODUCTION

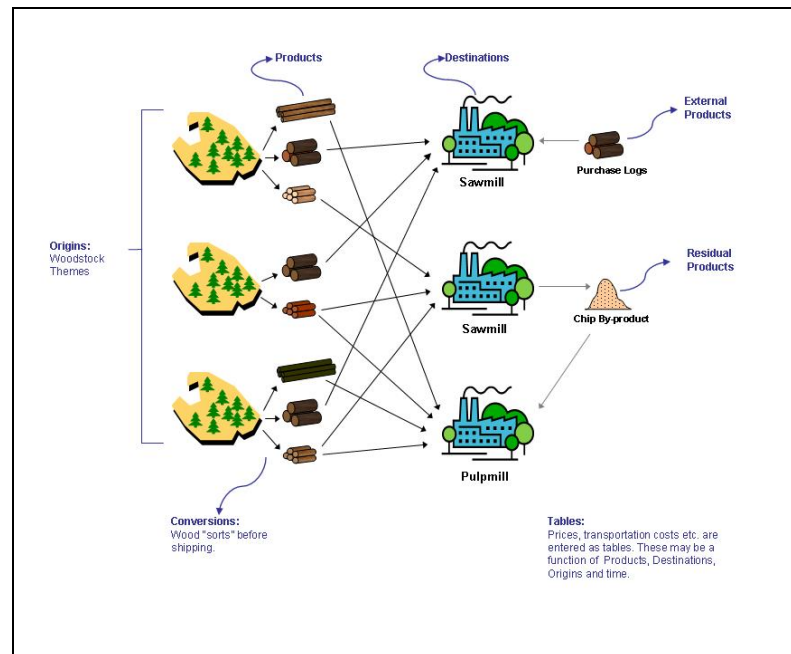
THE ALLOCATION PROBLEM – COMPLEX AND WORTH OPTIMIZING

Fibre allocation logistics are enormously complex – multiple product lines coming from the same log, numerous harvesting options, specific mill product demands, species mix and significant competition (and change) in the marketplace – are just a few of the issues that make allocation so complex. There is a need to make choices in a manner that ensures that revenue is maximized while all constraints are met.

For most organizations, the problem of allocating fibre to destinations (markets, facilities, etc) is incredibly complex given the significant number of allocation options where selecting the best choices can impact both cost and revenue considerably.

Consider this simple example: trees are harvested from the forest. Pulpwood is shipped to the pulp mill and sawlogs are shipped to the sawmill which produces lumber, chips and sawdust. The chip by-product can be shipped to the pulp mill or sold on the open market.

Assign the right log to the right facility at the least cost, and process it in the best manner.



While similar in nature, in reality most allocation problems are much more complicated than this, typically involving numerous products and many different potential destinations. In fact, it is likely that your organization has several mills to which to supply wood, hundreds of cutblocks from which to draw fibre, and 5, 10, 20 or even more

different products. In addition, it is likely that you have constraints such as mill capacity and demand, fluctuating market prices, and many other issues. This could generate up to a million or more different choices in a given period

How can you be certain that you are making the best decisions that maximize total profit or minimize total costs?

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If you are involved in supplying forest products in a multi-facility environment there are significant advantages to be gained from assigning the right log to the right mill and processing it in the optimum manner.

WHAT MAKES OPTIMIZATION SUCH A VALUABLE TOOL?

Optimization offers the best solution any time you are dealing with large, combinatorial problems where the number of possible choices and the corresponding constraints associated with each choice makes it impossible to consider every option separately.

Consider some of the following business elements that forest companies commonly deal with:

There are a lot of possible combinations – optimum means BEST, not BETTER.

- Multiple product lines from the same log and multiple cutting options for some logs.
- Distinct relationships among product mixes and log diameter and species.
- Complex logistics where mills are close enough for exchanges but not without complications.
- Significant competition for available open market logs.
- Differences in processing options, speeds and efficiencies among facilities.
- A large and varied wood basket.
- Some fibre exchanges with other companies.
- Uncertainties in markets with a broad range of prices and margins and a commitment to managing capacity.
- A move to more customer-driven solid wood production rather than pure commodity.
- Numerous harvesting scenarios and sorting options with respect to both species and diameter break points.
- A dynamic business environment where significant changes are commonplace.
- High degree of integration, particularly between sawmills and pulpmills.

WHAT IS THE ALLOCATION OPTIMIZER?

The Allocation Optimizer is a powerful extension to Woodstock that lets you build and solve complex fibre allocation problems.

It provides resource planners and managers with the tool to develop and assess strategies that allocate wood products to markets by considering wood supply origins, product transportation costs, delivered wood product prices, and destination demands and capacity constraints.

As an extension, it does not run on its own rather, it adds new capabilities within Woodstock to build the model and use all of your existing Woodstock data.

WHAT DOES ALLOCATION OPTIMIZER DO?

Allocation Optimizer applies the power of true mathematical optimization to a complex problem *and* does it within the larger context of your strategic and tactical management planning process. So you can consider those issues together, making tradeoff and investment decisions that optimize net revenue while considering all constraints.

Allocation Optimizer lets you make informed choices about allocation decisions - having considered all the possible allocation, product and destination choices.

WHO IS IT FOR?

Anyone who has commitments for fibre delivery to a number of markets ... will find Allocation Optimizer to be of significant benefit.

Allocation Optimizer is most commonly used by forest land owners, forest product companies, consultants or any organization or individual faced with multiple decisions about products and markets.

Anyone who has commitments for fibre delivery to a number of markets and has choices about where that fibre may come from – will find Allocation Optimizer to be of significant benefit.

Allocation Optimizer is applicable to you if:

- transportation costs form a significant portion of your operating expense,
- "just-in-time" delivery is of interest to you,
- your organization deals with complex exchanges between mills and markets,
- supply chain management is important to you.

USE ALLOCATION OPTIMIZER TO:

- Easily assess and explore multiple log allocation strategies to best meet your requirements
- Assess and evaluate post-harvest silviculture activities by considering the relationship between where activities occur to mill location and mill requirements

- Assess open-market wood purchase strategies
- Maximize total revenue by allocating products to destinations by considering all possible choices while meeting supply demands
- Develop a plan that minimizes total haul costs by associating treatment decisions with detailed transportation costs
- Identify allocation decisions that might not make sense at first glance (i.e. things you just would not have thought made sense) but do make economic sense when considering all the possible choices
- Identify bottlenecks - find out which mills are causing difficulties to meet demands
- Identify future wood supply problems for existing mills
- Explore the consequences of adding or closing a mill
- Assess and make trade-offs between/among different destinations
- Explore wood-supply strategies relative to acquiring or divesting forest land.

WHY USE ALLOCATION OPTIMIZER?

Consider allocation decisions at the same time you are scheduling your harvest or assigning other forest management activities.

If you are interested in better economic results through improved planning, and to be sure you are making the best, most illuminated resources allocation decisions possible, then you should be using the software.

Until now, many planners and managers faced with the complex allocation issue have simply put off dealing with it until after the strategic and tactical level plans were complete – and addressed this problem in isolation.

With Allocation Optimizer, the myriad of iterations of destinations, supply, demand, transportation and product choices can be evaluated efficiently at the strategic planning level *or* at the tactical and operational level.

SOME OF THE OTHER BENEFITS YOU CAN EXPECT INCLUDE:

- Faster planning and forecasting – so you can evaluate many more alternative strategies.
- Unlimited opportunity to optimize existing practices, test new technology, or react to changes in the business environment.
- Improvement in communications between departments – because the allocation process is now connected to the strategic and tactical planning process – not an afterthought.
- Improved knowledge of operations and understanding of fibre flows.

HOW CAN ALLOCATION OPTIMIZER HELP?

*A framework for
integrating and leveraging
important initiatives:
demand forecasting;
supply chain
management; real time
data capture and
transportation planning.*

Our conversations with forest managers, modelers and analysts tell us that companies are not certain they are making the best decisions about where to send each product.

Inherent in the decisions these forestry professionals make every day – the what, when, how and where to harvest – is the decision of destination.

In addition, the System provides a framework for integrating and leveraging other important initiatives including demand forecasting; supply chain management; real time data capture and transportation planning

ALLOCATION-RELATED CONSIDERATIONS IN FOREST PLANNING INCLUDE:

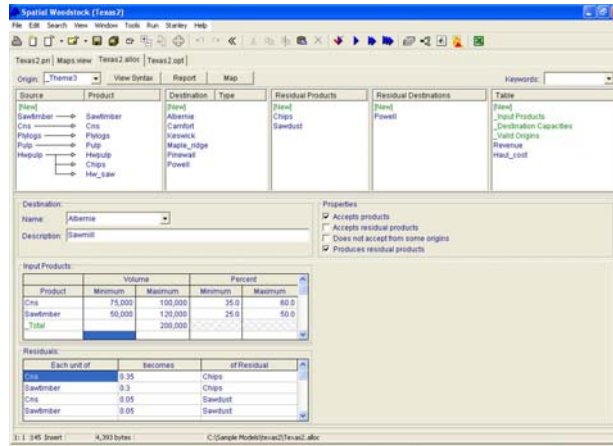
- Where to harvest with respect to location relative to destinations – this represents the chain of supply problem.
- Allocating strategic treatment decisions that meet specific mill and/or contractual obligations today and in the future
- Easily re-plan or re-allocate treatment decisions in the short-term due to outside market / political / administrative / logistic forces, and assess the longer term implications of re-planning due to short-term outside force response.
- How and where to strategically allocate your treatment systems (tree-length, short-wood, chippers) that have production capacity constraints? Assess different system configurations – adding new capacity etc.

HOW DOES IT WORK?

Allocation Optimizer is an extension to Woodstock and as such, is linked directly to your Woodstock model (and in fact becomes a part of the model). So you are not starting from scratch, and information derived from results can be integrated at the strategic and tactical levels.

Users specify the unique products and their origins, all of the possible destinations, the costs and prices related to each, and other key parameters such as minimum and maximum capacities and other relevant reporting information.

Products, destinations, prices and costs are all user defined and linked together through an intuitive interface

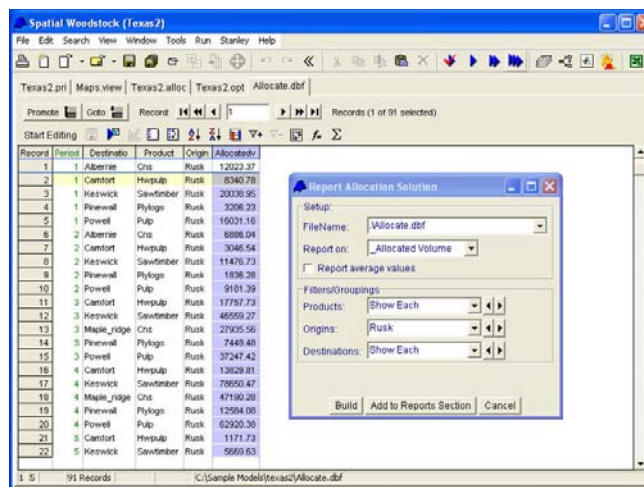


Based on these inputs, Allocation Optimizer will optimally allocate products to destinations (mills, shipping ports, landings, and other destinations for products), considering transportation costs, delivered prices, mill demand and other information in the model.

In this way, the software lets you:

- Easily add new complexity to the Woodstock model
- Easily add transportation costs and destinations to the forest planning problem
- Decide where to ship products over multi-time periods to meet supply requirements at the lowest cost or highest profit.
- Build allocation decisions into your strategic model, optimizing the decisions about what products should be directed to what market and when.
- Address detailed allocation issues at the tactical and operations level and then link the new information back into your overall planning process.

A range of reports lets you see your results. In this example, we can see a summary of the product volume allocated to each destination from a selected origin – in this case operating compartment.



WHY BUILD IT INTO THE REMSOFT SPATIAL PLANNING SYSTEM? THIS IS NOT A TRADITIONAL APPROACH

The most significant benefit is the ability to apply fibre allocation optimization at strategic, tactical, and operational planning levels while still maintaining the flow of data across all levels.

Remsoft and others have written extensively on the benefits of the hierarchical approach in forest planning, but in this case, the most significant benefit lies in the ability to apply fibre allocation optimization techniques at any or all planning levels, while still maintaining the flow of data across all levels.

When addressing the planning problem with a hierarchical system, you can address allocation objectives with Allocation Optimizer at the strategic level. This allows users to develop long-term forest management strategies that meet current and future mill product demands from the forest estate and other alternative supply sources at the highest economic value.

Or you can go ahead and carry out the analysis in the more traditional way – that is optimally allocate products to mills from spatially defined harvest blocks that were specified at the tactical or operational planning level.

When you are finished – take advantage of the integration in the planning system by linking Allocation Optimizer results from the post tactical level back into to the strategic plan and re-optimize. In this way, you also benefit from much tighter linkages amongst the strategic, tactical and operation levels of planning.

While Allocation Optimizer is not necessary for strategic planning, it can vastly – and quantifiably – improve the management of forest lands.

How? More comprehensive management plans –that include destination and product considerations will be more meaningful and will improve the overall relevance of your management plan to your planning problems and commercial goals.

Ultimately, you will enjoy greater operational efficiency and improved financial results.

WHAT ELSE CAN I DO USING THE ALLOCATION OPTIMIZER?

Easily assess and explore multiple log allocation strategies that best meets your requirements.

Once your basic allocation components are defined, there are a wide ranges of analyses you can perform.

Here are a few examples:

- **Minimize shipping costs OR maximize net revenue** - Associate treatment decisions with detailed transportation costs – a significant expense of wood procurement. Or maximize the net benefit by considering transportation costs and delivered gate revenues for each destination.
- **Explore alternate strategies** - Easily assess and explore multiple log allocation strategies that best meet your requirements. Optimization ensures that you are exploring all the range of possible outcomes.

- **Find new solutions** - Identify allocation decisions that don't make sense from human perception (i.e. things you just would not have thought made sense) but do make economic sense when considering the entire planning problem (i.e. all the choices)
- **Identify bottlenecks** - Find out which mills are causing difficulties to meet demands. Identify bottlenecks.
- **Identify wood supply problems** - Better insight into decreasing wood product supply or increasing product costs over time.
- **Explore consequences of actions** - What happens when I add a new mill or close a mill – how does this fit into the wood supply strategy? Identify advantages and disadvantages of these decisions.
- **Land purchase and sale** - Consider the implications of new land purchases or divestments on the destination demands etc.
- **Test a plan's robustness**: Is there sufficient flexibility built in for unforeseen events?
- **Identify wood supply chain problems** ahead of time. Easily move between these levels of planning.

HOW DOES THE ALLOCATION OPTIMIZER LINK TO WOODSTOCK?

The Allocation Optimizer is an extension to the Woodstock modeling system that is designed to optimize forest product allocation to the various demand centers. It lets you easily represent fibre allocation decisions in the Woodstock modeling framework, taking your Woodstock modeling that much closer to the ground.

When you build an allocation model, you are adding an additional section to your Woodstock model that details the forest products eligible for allocation and all of their candidate destinations. So not only do you optimize the management of the forest resource, you do so while meeting market and other demands.

Product value and transportation costs drive the Allocation Optimizer and you use constraints to ensure that product processing facility demands are met as closely as possible and at the best value to your organization.

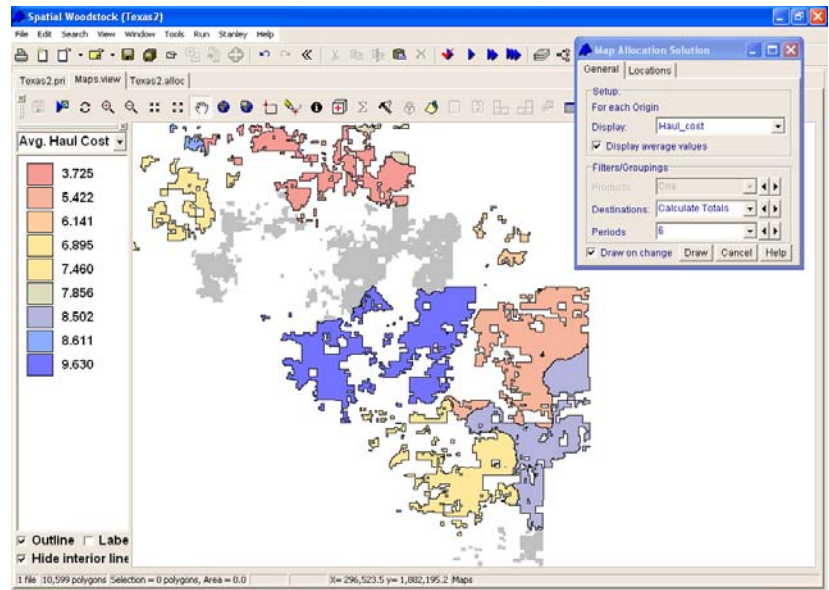
The Allocation Optimizer integrates seamlessly into the Woodstock model interface. Just as within a standard Woodstock model, the allocation section components become another model section that you can reference in objective functions, constraints, reports and graphs.

WHAT ABOUT SPATIAL LINKAGES?

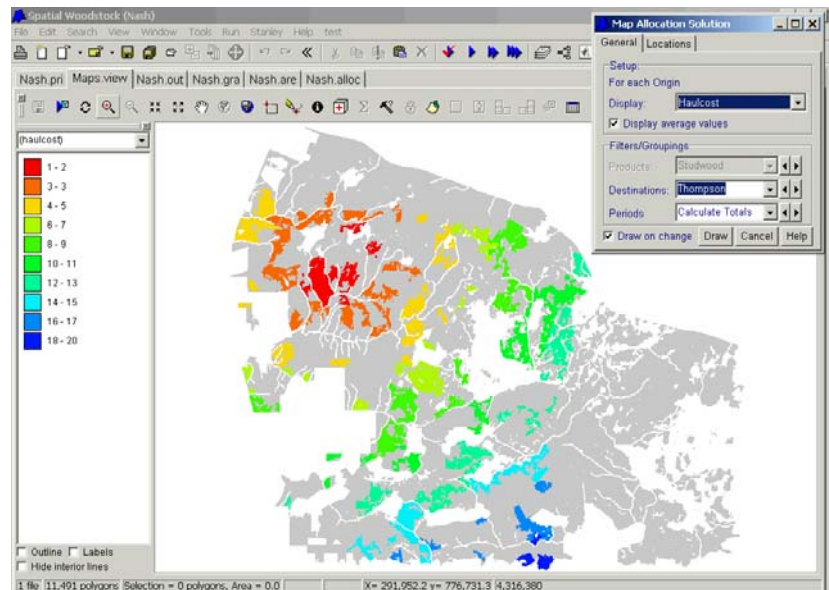
If you have Spatial Woodstock and access to a shapefile, you can display allocation model outputs on a map.

Essentially, anything you have defined in your allocation model may be mapped – including allocated volumes and the value of any user-defined tables that are indexed by origin.

This mapped allocation solution demonstrates the average transportation cost of delivering forest products from each operating unit to all destinations in period 6. The coloured areas on the map are “operating compartments”.



This map illustrates the average transportation cost of shipping forest products from each spatially defined Stanley harvest block to the “Thompson” mill. The coloured areas on the map are the Stanley harvest blocks.



WHAT ELSE?

WHAT DO I NEED TO USE ALLOCATION OPTIMIZER?

Allocation Optimizer is an extension of the Remsoft Spatial Planning System. Specifically, it works with Woodstock, so you will require a license to that software, as well as a Woodstock model.

Your existing Woodstock model may require some modification to reflect the allocation problem. You may need to update yield tables and outputs declarations to better reflect product breakdowns; you may need to create actions and transitions to represent different harvest systems (e.g., full tree versus cut-to-length systems); you may need to add a Landscape theme to your model delineating the different transportation cost units.

If you are planning on using the linear programming capability (optimization) you will need solver software. Remsoft software is compatible with most major solver software on the market.

COSTS, PRICES AND OTHER INPUT DATA

As with any model, you will need the data relevant for solving the problem at hand - includes information about destinations, markets, products, fibre sources, etc. These are entered in spreadsheet form and are stored in dBase tables..

Much of this data such as products and product prices are readily available, while other data, in particular transportation cost data, may require some analysis and synthesis before input into the Allocation Optimizer.

WHAT IS THE REMSOFT SPATIAL PLANNING SYSTEM?

The Remsoft Spatial Planning System is a complete software suite for developing long- term detailed forest management plans.

The system consists of four separate but integrated software packages – Woodstock, Allocation Optimizer, Spatial Woodstock and Stanley – that work together to let you formulate strategic management plans with tactical and operational feasibility.

Woodstock is forest-modeling software for creating integrated forest models and scheduling management activities to be carried out in the forest.

Allocation Optimizer lets you formulate and solve complex fibre allocation problems.

Spatial Woodstock functions as a map viewer tool and data manager for viewing, reporting and analyzing Woodstock, Allocation Optimizer and Stanley results.

Stanley creates a spatial harvest schedule (that is, builds and schedules spatial harvest units on your maps) based on your Strategic Woodstock plan.

Remsoft customers include blue chip companies in the forest industry and public agencies from throughout North America, Australia, New Zealand and Southeast Asia.

CONTACT REMSOFT

For more information or to find out whether the Allocation Optimizer can be of benefit to you, please contact us at:

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