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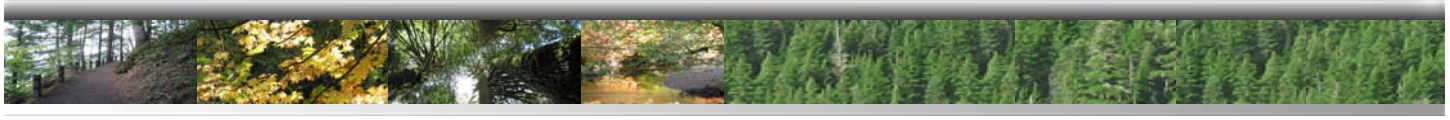
*World-class expertise for natural resource decisions...*



# The FORSight Resource

Volume 3, Issue 3 September 2006

***Upcoming Events...***

SSAFR_schedule

Symposium for Systems Analysis in Forest Resources
Sept 5-8
Burlington, VT
http://www.afrc.uamont.edu/pelkkim/SSAFR2006.htm

Who Will Own The Forest: 3
Sept 11-13
Portland, OR
http://wfi.worldforestry.org/wwotf3/

Society of American Foresters

SAF National Convention
Oct 25-29
Pittsburg, PA
http://www.safnet.org/natcon-6/2006brochure.pdf

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***Inside this issue:***



## How to Handle Non-Uniform Stand Density (Clumpiness) in ORGANON

It has been suggested that the yields produced by the ORGANON model be adjusted for the perceived clumpiness of the stand. This is not necessary. The Stand Projection System (SPS) and the Forest Projection System (FPS) each use a factor that each labels as "clumpiness." However these models use this factor in different ways and expect different values for it. None of these growth models directly use the clumpiness factor to modify predicted volume. However, all other things being equal, the stand volume may differ with changing clumpiness factor.

The Stand Projection System (SPS) uses a clumpiness factor for two purposes. Clumpiness is used to modify diameter growth by changing the magnitude of crown competition (CCF), and the model modifies predicted mortality in each diameter class. Values of clumpiness are allowed to range from 0.1 to 1.0. A default value of 0.75 is used to represent the clumpiness of plantations and 0.85 for natural stands. Given the same predicted class height the volume assigned to the diameter class is the same regardless of the clumpiness factor. Total stand volume may be different because the number of trees in each diameter class differs.

The Forest Projection System (FPS) uses its version of the clumpiness factor in a completely different manner. FPS is a spatially dependant model that is designed to be used with the coordinates of each tree projected. Since it is very unlikely that model users will actually take the time to measure the locations of all trees on their sample plots a coordinate generation procedure is included with the program.

The coordinate generation procedure calculates the locations of all trees in a 0.1 hectare area. It modifies the default spatial distribution based on the clumpiness factor. Once the locations of the individual trees are generated they are carried through to the end of the simulation. The level of individual tree competition changes as it and its neighbors grow and die.

*(Continued on page 2)*

## Does anyone do woodbasket studies anymore?

Woodbasket studies, also known as wood supply studies or mill resourcing studies have been used by industrial forest products companies for decades. However, with the recent shift in timberland ownership away from forest products companies, wood basket studies become even more important. Clearly, without the stability of a guaranteed supply of timber from their own timberland holdings, the mill owners must develop informed projections of the future expected supply within hauling distance of their facilities. Resource owners, too, need to understand the wood supply demand balance in order to understand its effect on future timber prices. Organizations that are looking to build new facilities also use these studies: areas with anticipated supply surpluses are appropriate locations for their new mills.

The idea behind a wood basket study is to compare wood supply to anticipated wood demand over time. To calculate wood supply the analyst must develop estimates of current wood inventory in the wood basin being modeled (e.g. sawtim-

*(Continued on page 2)*

# Woodbasket...

*(Continued from page 1)*

ber, chip-n-saw, pulpwood are calculated for each species group being modeled). These current estimates of wood inventory are projected over time to determine wood supply by product type for each time period being modeled. Care must be taken to account for volume that is not used by one mill type but that may be raw material input into another mill type (e.g. sawtimber tops, sawmill residual chips).

Demand is estimated by determining mill capacity at either the aggregate level (e.g. by state, by county) or by summing up the capacity on a mill by mill basis. Anticipated production levels and raw material demand are then calculated for the current period. Projections of future demand are made by incorporating announcement of new facilities to be built, announced or anticipated mill closures, and projection of increases in individual mill demand due to improvements in mill efficiency (mill creep).

These projections of wood supply and wood demand are then combined to determine the supply demand balance over time. They can take the form of supply-demand equilibrium models that force future supply and demand into balance and calculate anticipated timber inventory and price changes over time. Or they can be "what if" scenarios that calculate expected outcomes give the analyst's input regarding future supply, demand or investment assumptions. While these projections will never occur exactly as modeled they give managers important information about the wood basket being analyzed.

Wood basket studies can take two perspectives. The study may take the perspective of a current or future mill owner:

*Where will I get wood for my existing mill and will prices be stable, increasing or decreasing?*

*Where should I build new facilities to take advantage of anticipated supply surplus?*

It may also take that of the resource owner:

*Given the wood supply demand balance in the regions where I own timberland, do I expect timber prices to be stable?*

*If a supply imbalance will lead to price increases over the short to medium term, where should I increase investment in timberland/silviculture?*

The answers to these questions give important perspective to managerial decisions. Traditionally, these studies have employed empirical yield tables derived using existing inventory information. Because silvicultural practice continues to evolve with time, the expected growth of young stands is expected to be significantly different than older stands. Improved silvicultural techniques and improved planting stock are two reasons to expect yields from younger stands to exceed older stands. Overall, these empirically derived yield tables could be expected to under-predict the yields of stands managed with current practices.

FORSight Resources uses the latest growth and yield models to develop future yield projections the current and future silvicultural practices are appropriately represented in the future supply projections. This method shows a more realistic and accurate representation of the future expected supply demand balance given current management practices.

Often, a woodbasket study is an important first step in an overall management planning effort. Gaining an understanding of the wood supply dynamics in the area surrounding your mill or timberland provides an important outlook on wood supply surpluses or shortfalls, and a perspective on the direction of future prices. Understanding these answers to these issues sets the context under which to begin a strategic planning exercise.

## Clumpiness...

Volume prediction is not directly affected by the clumpiness factor but by the differential in mortality and stem form due to the altered spatial distribution. There is no guarantee that the stand level volume of a clumpy stand will be different from the stand level volume in a uniformly distributed stand.

ORGANON takes a completely different approach to modeling spatial heterogeneity. It assumes that the degree of local competition experienced by a tree is reflected in its crown size. Trees in clumps have shorter crowns than trees growing adjacent to gaps. As long as the crown lengths or crown ratios of the sample trees are measured then any long-term spatial heterogeneity within the stand will be modeled appropriately. In fact spatial heterogeneity at scales different from those used in the simulated stands in FPS will also be modeled.

In ORGANON volume is calculated at the individual tree level. The volume equations use crown length to alter the predicted tree taper. This means that a long crown tree will have a smaller volume (i.e. faster taper) than a short crown tree of the same species and size. This means that trees in clumpy stands will tend to have a larger range of crowns than trees in stands with uniform distributions, so their individual volumes will be different from the volumes of trees from uniformly distributed stands. As with FPS there is no guarantee that the stand level volume of a clumpy stand will be different from the stand level volume in a uniform stand.

In summary, SPS and FPS use what may be two different measures of spatial heterogeneity in different manners. SPS modifies its predicted volume by altering the number of tree in each diameter class. In certain cases FPS may modify its predicted volume by altering the form of the trees on the predicted plot. ORGANON uses crown ratio to describe the past level of competition of each tree. It may alter its predicted volume through the stem taper function of the individual tree volume equation.

## New digs for FORSight Vancouver staff!

The Vancouver, WA office of FORSight Resources has moved to a new location as of August 1. Please note the new address:

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3813 H Street
Vancouver, WA 98663
(360) 882-9030 (voice)
(360) 213-0320 (fax)

The new office has some nice new features, including workspace for all staff, kitchen area, private restroom, conference room, outdoor patio and a nice view of Mt. Hood (on a clear day).

Clients who visit the office should find it easier to locate. We are on the corner of 39th St, right at the exit onto I-5.

**FORSight Resources** provides world-class expertise to companies and agencies facing critical natural resource decisions. The company's offerings include forest planning, acquisition due diligence, forest inventory &biometrics, GIS & data services, custom system/application development and hardware/software sales.

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Trimble AUTHORIZED BUSINESS PARTNER

ESRI AUTHORIZED BUSINESS PARTNER

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## The FORSight Library...

### *Spatial Forest Planning: Where Did All The Wood Go?*
Karl R. Walters and Andrew Cogswell. 2002

**Abstract -** Spatial forest planning has become a hot topic in recent years. Numerous papers in the literature have been published exploring various aspects of the problem, commonly citing significant reductions in achievable harvest volume or present net value due to the imposition of spatial constraints. By and large, the problems associated with spatial planning tend to be driven by economic, social and political requirements. In this paper we examine three different spatial issues and their impacts on management objectives.

The basic assumption of all stratum-based harvest schedules is no minimum/maximum block size. Unfortunately, this assumption can severely overestimate the operable land base in regions where forests are heterogeneous and stand size is small relative to economic block size. Strategic models that do not consider spatial operability guidelines tend to severely overestimate harvest volume or present net value, resulting in significant relative shortfalls in the tactical plan. By applying the spatial operability lock feature of Spatial Woodstock, the strategic harvest volume was reduced by 7.6%. However, the blocked harvest schedule yielded much better results with only an 8.2% shortfall relative to the new strategic volume target.

Harvest block configurations can be limiting under adjacency and green-up restrictions. In areas where there is little flexibility in locating operable harvest blocks, the configuration of blocks can yield significant differences in achievable harvest volume.

One of the most onerous aspects of spatial planning is accommodation of green-up intervals, where the harvest of adjacent and proximal harvest blocks must be delayed by a minimum number of years until the current harvest block reaches a desired stand condition. A difference of one year can make a dramatic difference in shortfalls. Stand establishment methods that shorten the time to desired stand-condition probably have the largest pay-off.
For a copy of this paper please visit us at http://FORSightResources.com or email us at info@FORSightResources.com to request a copy.

## In the Next Issue...

*Harvest scheduling models: stumpage or delivered price?*

*Emerging Technology Review*

*Growth Model Review - FORSight Proprietary Hardwood Model*

*Managing Timberland with Price Uncertainty - A Case for Tactical Planning*

*The FORSight Library ...*

*Letter from the Editor*


*The new Vancouver office is just off I-5. Take the 39th St exit and head west to H Street.*