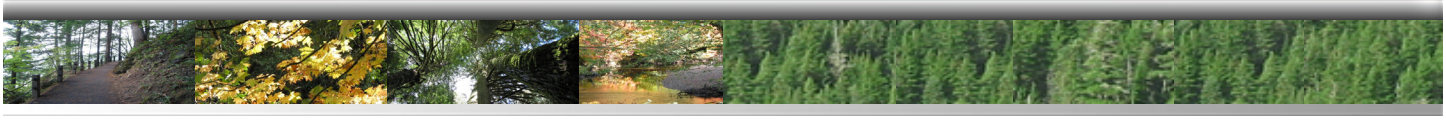
FORSight Resources, LLC

World-class expertise for natural resource decisions...



The FORSight Resource

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Upcoming Events...

Who Will Own the Forest? 5
September 14-16, 2009
Portland, Oregon
http://wfi.worldforestry.org/wwotf5/

SAF National Convention
September 30-October 4, 2009
Orlando, FL
http://www.safnet.org/natcon-09/index.cfm

WFC 2009
XIII° World Forestry Congress
Buenos Aires | Argentina
18 - 23 OCTOBER 2009
http://www.wfc2009.org/en/index.asp

Seventh Southern Forestry and Natural Resource Management GIS Conference
Athens, Georgia
December 7-9, 2009
http://www.soforgis.net/2009/

Inside this issue:

Wood-Basket Studies–Is It Time?

Ed. Note. This is a reprint of an article from a 2006 newsletter. Given the economy and developments in bio-energy, we felt it was time to revisit the issue.

Wood-basket studies, also known as wood supply studies or mill resourcing studies, have been used by industrial forest products companies for decades to gain insights into local supply and demand issues that affect pricing and availability of mill furnish. Historically, the forest products industry owned large tracts of timberland from which substantial proportions of their mill demand could be met. When stumpage prices were high, the companies could procure wood more cheaply from their own timberlands, and when prices were low, they could procure wood on the open market (or at least, that was the way it was supposed to work).

With one major exception, all of the largest forest products companies have largely sold off their timberland holdings to the investor class (REITs and TIMOs). The resulting shift in land ownership and management direction has increased the importance of wood-basket studies. 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.

But mill owners are not the only organizations that benefit from wood-basket studies. Resource owners need to understand the wood supply demand balance in order to understand its effects on merchandising specifications and future timber prices. Organizations that are looking to build new facilities (anyone heard of wood pellet plants and bioenergy plants?) also use these studies to select areas with anticipated supply surpluses which would be appropriate locations for their new mills.

So what are they?

Wood supply studies compare wood supply to anticipated wood demand to determine supply/demand balance over time. To calculate wood supply, the analyst must develop estimates of current wood inventory in the wood basin being modeled. Volumes of each product type (e.g. sawtimber, chip-n-saw, pulpwood, biomass) 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 ac-

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What's new at FORSight Resources?

FORSight Resources passed a significant milestone in February, completing its 5th year of business. To celebrate, FORSight is offering a discount on its FORSim-PNW and FORSim-LPGS software of 25%.

4Sim
by FORSight Resources

REMSOFT CONSULTING PARTNER

FORSight Resources has been named an authorized Remsoft Consulting Partner. The program is available to only the most skilled and well respected firms that offer a range of services and competencies around Remsoft products.

Because of FORSight's ongoing business partnerships with companies like ESRI, Trimble and Remsoft, we can help you with needs identification, specifications and custom programming to meet your exact requirements. As always, FORSight offers GSA pricing on ESRI and Trimble products.

From the Help Desk

***Question**. I have been using both the 2006 and 2008 release of the FORSim-PNW software implementation of ORGANON and have noticed a disturbing anomaly concerning the height growth. Specifically when I divide the grown height by the grown diameter, a height to diameter ratio, I find some numbers in the 11-14 range, which exceeds what I normally find in my stands. This trend seems even more pronounced in the 2008 release. I ran the same data through both versions and the trees per acre and diameters were identical, but the volumes were different all because the height was different on a few trees. I suspect that the problem is in the underlying ORGANON formulas, but I was wondering if you have run into this and what your thoughts are. I can send you the actual input files I referenced if it will help at all.*

To address the user's question, we needed to be able to replicate the issue ourselves and so we asked for the user's data input files. One possibility that could be the source of the problem was the hemlock equations FORSight incorporated into a customized ORGANON DLL for the 2006 version. In 2008, a new ORGANON DLL was released by Oregon State, and FORSim was updated to use that DLL as well.

We checked into the ORGANON revision history and found that unreasonable height/dbh ratios were reported and fixed last year. To satisfy ourselves that the ORGANON code was properly implemented in FORSim, we ran the user data through the latest version of ORGANON and compared the results to FORSim. Despite some minor differences, overall results were essentially the same.

Using additional data provided by the user that included remeasurements (original = 34 years, remeasured = 54 years), we did some further digging.

We found that ORGANON's calculated DF site index was too low to result in sufficient mortality to match the survival TPA measured 15 years later. Interestingly, the original plot data suggested a calculated site index of 107, whereas the remeasurement plot data suggested a site index of 115. We tried a few different runs at various SI values to observe the effects on survivor diameter growth.

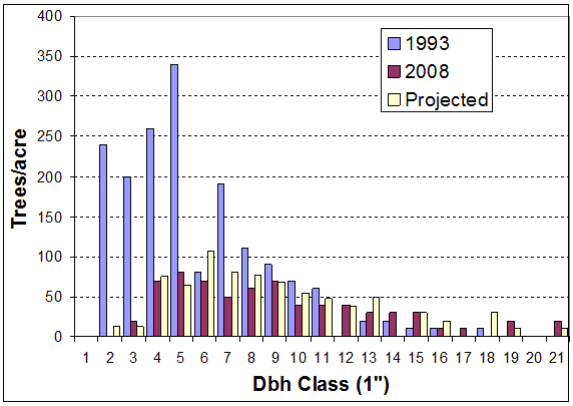

Figure 1. Diameter distributions of original, remeasured (actual) and projected plots.

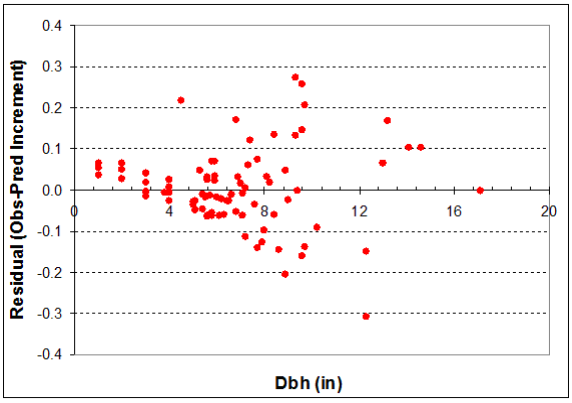

Figure 2. Residual (obs-pred) annual dbh increment.

The remeasurement plot data showed a TPA of 690 with a BA=328. Projecting the original plot data using SI=107 resulted in 847 TPA with a BA=335 and DQ=8.5. Using a SI of 125, the original plot data resulted in a projected TPA of 788 with BA=344 and DQ=9.0. Finally, using SI=150, the projected TPA was 699.9 with a BA=354 and DQ=9.6.

Overall, the projected TPA decreased, the projected BA increased, and the projected DQ increased with increasing SI. However, the diameter increment was on the larger trees, and the smaller trees increased in height but not in diameter.

Figure 2 is a graph of residuals vs dbh, with residuals equal to the observed annual dbh increment minus the predicted increment. The overall mean residual was 0.0039 inches, which means only a 0.0039*15=0.06" underprediction. However, the graph shows much variability and definite trends in predicted dbh increment. Relatively small annual over and under-predictions become much larger differences with the observed values over the 15 year projection period.

Overall, our investigation showed that FORSim-PNW was calculating diameter and height growth in a manner consistent with the most recent versions of ORGANON. So what does that mean to our friend trying to use FORSim-PNW and ORGANON to predict growth on his stands?

Unfortunately his particular stand is on the margins of what we would normally expect in the Pacific Northwest. FORSight Resources has done numerous data audits on client inventory data and we have become quite adept at identifying *anomalous stands*—stands that have combinations of site, diameter, age and height that are not typical for the region. Often these anomalies are the result of erroneous data, but in the case of our FORSim user, the data is real.

Because the user data is not *typical* it is unlikely that it would look like data used in the construction of ORGANON growth equations and it is not surprising that the resulting growth projections would be inaccurate. In the general case, ORGANON does a good job of predicting tree growth, but there will always be examples where it misses the mark. A local calibration of the of the growth equations using local plot data may be in order if results are consistently (and excessively) inaccurate for your use.

All models are wrong, some are useful.
- George Box, Statistician

Wood-basket studies...

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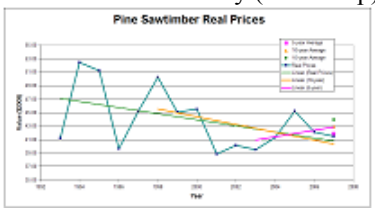
count for volume that is not used by one mill type but that may be raw material input into another mill type (e.g. saw-timber tops, sawmill residual chips).

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 given 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.

Two perspectives

As alluded to above, these 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?

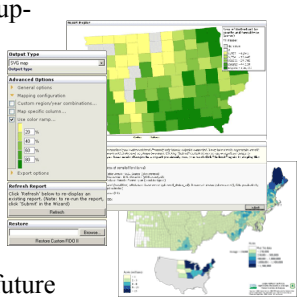
It may also take the perspective of the resource owner:

- Given the wood supply demand balance will timber prices be increasing decreasing or stable in the regions that I currently own timberland?
- Where would be appropriate places to increase investment in timberland (or silviculture) due to supply imbalances that will lead to price increases over the near term?

Depending on your outlook the answers to these questions provide important perspective to a manager's decisions.

Traditionally these studies use empirical yield tables derived using existing inventory information. Because of this tendency to look backwards , this method is biased in that younger stands have inherent yield differences due to the advent of improved silvicultural techniques and improved planting stock (genetics and morphological properties). Older stands will have yields that represent the silvicultural practices and planting stock of the day and thus will generate lower expected yields. Overall these empirically derived yield tables will under predict the yields expected using current practices.

FORSight Resources uses a different approach to model future yields in these wood-basket studies. By using 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 wood-basket 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.

So why now?

Bruce Carroll, who worked on a lot of wood-basket studies as a forest economist for Boise Cascade, had this to say. "As a mill owner, one might ask, 'Why would I do a wood-basket study now? Surely demand has been reduced due to the slowdown in housing construction.' Well that is *exactly* the reason you should undertake a wood-basket study at this time."

"Procurement organizations often restrict timber purchase to areas where they have bought in the recent past; that is, they become stuck in their ways. They know that they shouldn't try to bid on wood up in Northeast County because they always get beat on price by Local Logger Inc. But with the severe reduction in wood demand due to permanent mill shutdowns and temporary mill curtailments, the entire wood supply and demand picture has shifted. In my example, Local Logger is no longer purchasing in Northeast County because the mill in the next county over shut down 2 months ago. Thus he has shifted most of his log purchase efforts into Northwest County, further away from your mill."

"This is happening all across your normal wood purchasing area, leading to many opportuni-

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ties to lower your delivered wood cost by seeking out and capitalizing on these market disruptions."

"Another interesting dynamic underway is the increased demand for wood for feeding biomass energy needs. Cogeneration plants have been around for many years and are usually associated with pulp mills. With the increase in energy costs over the past few years additional cogeneration plants have been built at many locations. At the same time, there has been a dramatic increase in demand for wood pellets for both domestic use and export. Several plants have been built and are already in full production. Of particular interest to pulp mill owners is the pellet plant that started up in Cottondale, Florida. In order to provide a more consistent furnish for the plant the plant accepts pulpwood-sized material rather than just wood waste. Thus, this mill competes directly with pulp mills in the area for wood supply."

"With all of the increased fiber demand to feed these energy plants, competition has increased substantially and is likely to continue to increase in the future. It would be wise for wood-using facilities—including those using traditionally underutilized wood waste material—to undertake a wood supply study to understand the supply/demand dynamic in their wood-basket. Maybe we should call it a *fiber-basket*?"

"Landowners should also consider completing a comprehensive fiber supply study to fully understand the future demand for sawtimber, chip-n-saw, pulpwood, and logging residue. This will help to inform the landowner about future price for these products and help determine appropriate management regimes to target production of products expected to be in high demand in the future."

Read more about wood-basket studies at http://www.FORSightResources.com/techsheets/WoodBasket.pdf

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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Recently presented...

Barber Revisited: Aggregate Analysis in Harvest Schedule Models

Steven Mills, Bruce Carroll and Karl Walters. 2009

Abstract– One of the most important yet commonly overlooked issues in harvest schedule modeling is age-class aggregation. Bias caused by aggregated age classes was first examined by Barber (1985). Since that time, Barber's work has been widely cited as justification for assumptions made during model formulation. The applicability of his results to constrained linear programming harvest schedule models is unclear. A study was conducted to examine the relationship between aggregation assumptions and harvest volume, area, and average age bias in constrained linear programming models. Methods parallel those employed by Barber (1985), with changes reflecting the use of mathematical modeling as well as updated management practices. Results indicate that constrained harvest schedule models with aggregated age classes consistently exhibit positive volume bias relative to models with annual age classes. These results differ from Barber, who noted a bias toward underestimating harvest volume and indicate that extending Barber's earlier work to constrained mathematical programming models should be approached with caution.
Key Words: Forest planning, forest modeling, timber yields, periodic analysis, linear programming.

For a copy of this slide presentation, visit our website:
http://FORSightResources.com/library

Through every rift of discovery some seeming anomaly drops out of the darkness, and falls, as a golden link, into the great chain of order.
-Edwin Hubbel Chapin