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Northwest Woodlands

A Publication of the Oregon Small Woodlands, Washington Farm Forestry, Idaho Forest Owners & Montana Forest Owners Associations

ECONOMICS OF FOREST MANAGEMENT

Financial Analysis Principles and Applications

Timing Your Timber Harvest

The Realities of an Owner-Managed Harvest

Does Rocking Roads Pay?

Tractor Ownership

How to Pay Your Logger

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Fire

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When to time a timber harvest is a big decision for small woodland owners. The use of various financial tools can assist in the decision-making process and help maximize financial returns. Photo courtesy of William E. Schlosser, Ph.D., Forest Econometrics.

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PRESIDENT'S MESSAGE

Washington

TOM WESTERGREEN

Economic Principles Used in a Variety of Ways

As small landowners we have a wide diversity of forest types and reasons for owning property. Many hold land as an economic investment, considering each forest management decision's financial return. Others have purchased a parcel of forest for the "lifestyle" they desire, like protecting the trees, providing a home for wildlife, and enjoying the aesthetic beauty and solitude of the forest. This wide range of ownership objectives is why our parcels, scattered across the landscape, offer exceptional economic and environmental value to society.

This issue of *Northwest Woodlands* will provide a variety of forest economic information that landowners will want to consider. How we manage our smaller parcels is usually very different than large forest owners. Integrated forest products corporations, TIMOs, REITs, and other large industrial investors have stockholders, pension funds, and others that expect a reasonable return on their investment. The forest management decisions they make have been closely analyzed to assure projected returns, whether on a quarterly basis, 10-year holding plan, or longer investment strategy.

Small forest landowners use forest economics in a variety of ways. For many, an economic return is one harvest in a lifetime, while others find ways to produce periodic revenue. Whatever your goals or needs may be, using economic principles when thinking and planning forest management activities can be beneficial. After a harvest (or if you have extra income to invest into your land), what decisions will you make? There are minimum reforestation requirements required by forest practices regulations, but will you do something more? What about spending extra money to do site preparation before planting, buying larger planting stock that may come from genetically improved seed, planting red cedar that will require more labor to protect from the deer and elk, or maybe precommercially thin an overstocked 15-year-old plantation? These are management decisions *only you can make*. It will be prudent to research the economic returns of different forest management practices. Lots of information is available, so my advice is to go to several sources since opinions vary, as do particular situations.

Even for those of us that are more "lifestyle" forest owners, where an economic return is a lower priority than other values we cherish, there are decisions we can make to accomplish multiple goals at the same time. For example, when you prune your trees to reduce wildfire impacts, you also improve the aesthetics of your property and the value of the trees far into the future. Many forest management practices can improve wildlife habitat, the health of the forest, and also the enjoyment of owning forestland. You never know when income may be needed. Improving the economic value of your property will provide benefits in the future.

Utilization of forestry management economic principles can provide so many other benefits to a family forest owner than just a financial return.

Keep 'em growing. ■

PRESIDENT'S MESSAGE

Idaho

PAUL BUCKLAND

Make Your Forest a Blue Chip Stock

The price of wood is on the rise again. After a protracted recession in the forest products sector, this latest price increase is good news for us landowners with merchantable timber ready for harvest. Macroeconomic trends such as unemployment, inflation, national and international income and outputs, and societal-level demand all swirl around to determine the general market value of our product.

Macroeconomics is all fine and dandy, but few of us small landowners control enough "product" to influence the greater market...individually, at least. Collectively, small forest landowners are extremely price sensitive so we tend to focus on nano-economics. Nano-economics is the economic theory of a single transaction. In other words, how much will *that* mill pay for *my* timber right *now*? Obviously, we want the highest price for our timber when we go to sell it. So, what can we do to increase the value of our product?

I love to prune, so my first inclination is to say, "Prune!" Straight, knot-free wood has a higher quality, so it's worth more, right? I'm sure most people who work with wood will agree...or, would they? Recently, I asked a colleague of mine in the saw-milling industry, "What could I do to increase the value of my timber?" His response was, "Grow a lot, and grow it fast." Not the response I was hoping for, but he's probably right. Here in Idaho, we have some of the most technologically advanced mills in North America. That's good for all landowners because investments are being made in our forest products infrastructure. A robust market and infrastructure are essential to primary producers like you and me (growers of the base product). However, it's a commodity market. Think 2x4s and pulp chips. There's virtually no premium for knot-free timber in our current market, so the return on investment for pruning is low or negative.

I'm a contrarian by nature, so I don't tend to "follow the crowd." I want my product to stand out in the market place, thus garnering a higher price (hopefully). Therefore, I continue to prune, precommercial thin, and fertilize to make my forest grow faster. You've heard the old axiom: "You can make something fast, good, or cheap—pick any two." Well, some might say I've chosen fast and good, because none of the above forest management activities are cheap...that is, if you have to pay someone else to do them.

Spending time out in your woods, managing and improving your forest, is a healthy investment. A blue chip stock, if you will. It pays dividends every time you're out there investing time and effort—and it does so for a long time. In terms of cash outlay, personally managing your forest is relatively cheap—some saw-gas and elbow grease is all. I guess there is a way to be contrary to an axiom. Fast, good, *and* cheap! ■

PRESIDENT'S MESSAGE

Oregon

SCOTT HAYES

The A+ Plan

My forest economics class at Oregon State presented an interesting lesson in predicting the future. In 1974, the pond value for small diameter Douglas-fir (less than 12" dbh) was less than $100 per thousand board feet. Pond value is the price paid for a log delivered to the mill, a legacy term reflecting the days when mills stored big logs in water. Our class was broken into teams, each assigned to develop a management plan for a forestland tract. My team decided to manage a substantial stand of small-diameter red alder for future hardwood production. It is safe to say that, 40 years later, our vision of managing a "weed species" was correct, but the professor's C- grade reflected the economic thinking of the time.

About the same time five college seniors were betting on alder futures, a group of woodland owners banded together to create the Oregon Woodland Cooperative. Their goal was to collectively offer substantial small-log sales to local mills in exchange for higher prices. Back then, most family woodland owners had small logs (and alder), while most mills wanted large logs. This market-driven demand for big logs rewarded owners with pond values twice, thrice, or quadruple the price paid for small, low-volume logs.

Then an unpredicted event happened in 1990: the northern spotted owl was declared a threatened species. Everyone knows the story, but the bottom line has been a dramatic log price escalation with a narrowing price point between large and small logs. If you argued four decades ago that small log prices would breach $700 per thousand board feet in 2014, you would have been a celebrated member of our C- economics team!

In this issue you'll learn about harvest economics. About 25% of OSWA members have 40 acres or less, and because of this size, thinning and final harvest are not a major part of their management plans (in the short term). However, you will find other useful articles related to economics in this issue.

Finally, forest certification is a goal each family woodland owner should be interested in obtaining. Economics are starting to drive certification. Many Oregon mills want to know if your land is certified. Idaho has a few mills that pay a small premium for logs from certified lands. Good public policy in some states requires forest certification before granting a lower forestland tax assessment. If your woodland is not certified, please consider the economic benefits of having a certified forest management plan.

In the Pacific Northwest, good forest economics are based on our productive soils and abundant moisture. When we bought our woodland in 1996, the trees were mostly pre-commercial. Now 16" diameter trees seem to be everywhere. That's Oregon Forest Economics 101 and our certified woodland gets an A+. So should yours. ■

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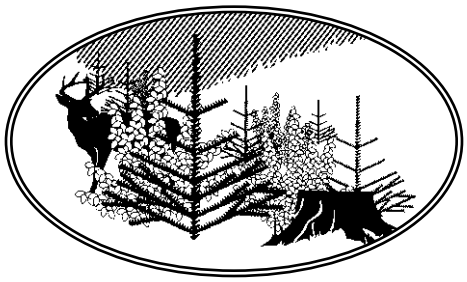

DOWN ON THE TREE FARM

TIPS & TRICKS OF THE DAY: Hire a college student to do your precommercial thinning work. Preferably a family member you were prepared to make a college investment in already.

WHAT TO DO IN . . .

MAY

► **Marketing Your Logs or Timber—Think Certification**

❑ Lowe's and Home Depot only sell certified wood. Their customers want it. Weyerhaeuser buys only certified wood for their mills and have said they prefer our certified wood. Other mills also require certification or ask if you are certified. I think it is clear that being certified will become the norm. The cost of being certified may not be rewarded by a premium for your logs or timber. We are all aware of the cost of fuel in our own vehicles. The cost of diesel has dramatically raised the cost of hauling logs to a mill or yard. If you have to haul your logs past a mill because you are not certified, you are losing money. So think of being certified as retaining your marketing options.

► **Firewood Processed Before Fire Season**

❑ I prefer getting my firewood bucked and split before fire season starts. This allows your firewood to properly season during the hottest summer months.

► **Purchase Seedlings for Winter 2014/2015 Planting**

❑ You need to know how many acres you are planting, the number of trees you will plant per acre, and the species you are going to plant. Acres times trees per acre will give you the number of seedlings you need to order.

► **Wait to Thin: Sap is Up and Bark is Loose**

❑ May and June are not the months to be doing a thinning operation. The bark is easily knocked off the trees you are trying to save for future crop trees

► **Google Earth—Take a Virtual Tour of Your Property**

❑ Your feet on the ground trump a virtual tour on the internet every time, but the virtual tour does let you look at all of your property including the places your feet didn't go. A couple of things about Google Earth you should know:

- Free software available for download from the internet.
- You need a faster connection than dial up.
- New photos are high resolution so you can see a lot more detail than historically.
- Some areas get flown each year. Others less frequently. My latest photo is 2012.
- Historical photos are also on line so you can go back in time.
- Your cursor tracks latitude, longitude and elevation that are displayed at the bottom of your screen. I am a land surveyor and I believe the elevation is plus or minus a couple of feet.
- If your aerial view goes from bird's-eye to more of a side view, hit the R key on your keyboard and you will return to bird's-eye view.

JUNE

► **Fire Season is Here**

❑ Most of us will have fire season start in May or June. With typically more hot days occurring in May and erratic summer precipitation, fire season can grow longer even for wetter sites in northwest Oregon and western Washington. Here are a few things you could do to reduce fire danger and/or be prepared for quick response.

- Make sure your fire equipment is in good working order. Your best bet in preventing a large fire is to find it early, and keep it small until help arrives.
- Don't have any fire equipment? Maybe you should acquire some for quick response. Your local forest fire protection agency has a list of required equipment to run an operation during fire season and this might be a good place to look to see what you might want to acquire. Used equipment is cheaper after fire season than just before fire season.
- Make sure your power saw spark arrestor screen is functional.
- Have your fire extinguishers recharged and checked out. The contents can settle to the bottom of the extinguisher and will not help you extinguish a fire.
- Make sure you have at least one operating fire extinguisher in each of your vehicles, on each piece of equipment, and on your person when you operate a power saw, lawn mower, weed whacker, etc.

- Operate equipment in compliance with the fire regulations that apply to your forest property. Apply these regulations to your home site if it is on or adjacent to your forestland, even if it technically falls under another fire protection jurisdiction that is less restrictive. So, don't mow your lawn or driveway or around your seedlings in the heat of the day when a logging operation in your forest would be shut down.
- Beware of ATV riders during hot dry weather. They can easily start fires.
- Build a pond for a pump chance and/or access by a helicopter to dip water.
- Construct and/or maintain fire breaks along public roads that abut and/or pass through your property.
- Prune trees around structures and along natural fire breaks such as roads to slow or stop the fire and keep it on the ground and out of your tree crowns.
- Dry your firewood away from your dwelling and outbuildings during fire season. Move it close to your place of use after fire season is over.

► **Who Am I?**

- ❑ I am wild, but not from around these parts.
- ❑ You have probably used or heard my name used, out of context I would say, to describe the behavior of someone other than members of my species.
- ❑ I have been told I am intelligent.
- ❑ I have been pardoned by the President.
- ❑ Benjamin Franklin might have chosen me over the bald eagle as the national bird.
- ❑ Males of my species are polygamous and we mate with as many hens as we can.
- ❑ I am a large game bird. Toms weigh in on average at 16 pounds and hens at 9 pounds.
- ❑ Who am I?

JULY

► **Road Work:** When you have harvest income, reinvest some of it in your road system.

- ❑ Add rock to your existing rock roads.
- ❑ Rock a dirt road to plan ahead for your next timber harvest when the market is good.
- ❑ Rock a dirt road for light duty winter access such as reforestation or precommercial thinning.
- ❑ Replace and/or add culverts and water bars. CMPs, corrugated metal pipes, will rust out and need to be replaced.
- ❑ Replace a culvert in a seasonal stream with a surface crossing.

► **Stream Crossing Work—Late Summer tis the season to do stream crossing work:**

- ❑ There is grant money for replacing existing crossings with fish friendly crossings. Getting one of these grants could save you a lot of money rather than waiting until you need to replace your structure and footing 100 percent of the bill. A good place to start is with your local watershed council.

► **Integrated Pest Management Plan—Equipment Cleaning**

- ❑ Have your logging contractors wash their equipment before they enter your property as a part of your Integrated Pest Management Plan to help you control the spread of invasive weeds on your property. Your own forest vehicles may also be guilty of transporting invasive weeds to your forest property. Washing rock trucks and log trucks may be impractical until we have drive-through washing stations at rock pits and log dumps. Because rock and log trucks are confined to your roadways, your Integrated Pest Management Plan should incorporate visual inspection and control of invasive weeds along your roads. Designing and implementing your plan now would be doing your part to control the spread of invasive weeds.

► **Know Your Woods Words**

- ❑ Ungulates—Mammals with hooves. Deer and elk are ungulates and are the property of our respective states. They are also farm and forest pests that eat your livestock pasture and the new growth on forest seedlings.
- ❑ OWC—Oregon Woodland Cooperative. They now have essential oils from native conifer needles for sale online under the Canopy brand. Possible aphrodisiac I hear. You can shop or take a peek at what OWC is up to at www.oregonwoodlandcooperative.com. Their bundled firewood program is booming in the Portland Metro Area also. Questions, contact Neil Schroeder at 503-628-2344 or neilschroeder11@gmail.com.

Who Am I?

A wild turkey, *Meleagris gallopavo*

Down on the Tree Farm *is edited by David Bateman with help from Linn County Small Woodlands members Aaron White, Joe Holmberg, Roy Stutzman, Steve Kohl, Neal Bell, Jim Merzenich, Rick Fletcher, Tim Otis, Mike Barsotti, and Brad Withrow-Robinson. This column is a project of the Linn County Small Woodlands Association and the OSU Extension Master Woodland Managers. Suggestions always welcome; send to Dave Bateman at knothead@smt-net.com.*

Financial Analysis Principles and Applications for Private Forestlands

By KEVIN W. ZOBRIST

Your forest is one of the greatest capital assets that you own. Just as biological and ecological health is important, so is its financial health. A financially healthy forest is one in which costs and revenues are carefully planned for, minimizing financial burdens to landowners and providing opportunities for supplemental income that can offset the costs of management, be reinvested in the land to support stewardship activities, be invested in the stewardship of additional acreage, or be used to meet other family needs.

Financial analysis is useful for day-to-day decision making such as purchasing or upgrading a piece of equipment or planning a timber stand improvement activity such as thinning. It can also be used for long-term management planning such as a future harvest. Forests need to be managed over long time horizons because there may be several decades between harvests. Depending on rotation length and ownership turnover, some forest owners may only harvest once in their lifetime. A bit of financial planning can make the difference between a successful harvest that meets multiple objectives or a poorly timed harvest that leads to needless loss for the landowner.

This article summarizes several basic principles of forest finance provided in WSU Extension Manual EM030, "Financial Analysis Principles and Applications for Private Forestlands." The full publication is available for free download at https://pubs.wsu.edu/ItemDetail.aspx?ProductID=15391 and introduces basic financial principles, as well as providing examples of how these principles might be applied to the management of your property. Some advanced concepts are also presented in the manual for those that wish to go deeper into the subject matter.

PHOTO COURTESY OF KEVIN W.ZOBRIST

A stand of Douglas-fir trees. Using forest finance principles, landowners can make informed decisions on the best time to harvest.

Basic principles of forest finance

A forest can be viewed from a financial perspective as an investment. The startup costs such as purchasing land and planting trees represent the initial investments. Maintenance costs and forest improvements (e.g., pruning, weed control) represent subsequent investments. Growth of the trees and development of high-quality habitat and aesthetic features represent interest over time. Harvest revenues or the enjoyment of habitat, recreation, and aesthetics represent future returns from the investment.

Because forestry is a long-term enterprise, it may be decades before you realize a return on your investments. Understanding the time value of money will help you understand the economic relationship between forestland investments and returns.

Compounding and discounting

The adage that "time is money" may indeed be true, as the value of money has a time component. Money

received today is worth more than money received in the future. Thus, if someone gives up a certain amount of money today by loaning it out, they expect to receive a greater amount in return in the future. Likewise, borrowers are willing to pay back a greater amount of money in the future in order to have the use of money today. The additional future value is known as interest.

The power of interest is that it compounds over time. Consider an investment of $100 at an annual interest rate of 5%. After one year, the balance of the account will be the original $100 (the principal) plus $5 interest for $105. However, after the second year, 5% interest will be paid not only on the $100 principal, but also on the $5 interest that accrued the first year. The second year's accrued interest is $5.25 for a new balance of $110.25. Interest payments will continue to increase each year as interest is paid upon interest. Compound interest results in exponential growth—$100 compounded over 50 years will grow to $1,147. If the interest rate doubles to 10%, the value grows to $11,739. This is also true with discounting, which is compounding in reverse and allows you to find the present value of a future amount

–Continued on next page–

Is the Future Worth Anything?

When evaluating the present value of expected goods (monetary or otherwise) received far into the future, it may appear that the future is of little worth today. Forestry is unique in its long-term nature and landowners tend to be particularly forward thinking and future oriented.

Landowners and foresters have struggled with the concept of compound interest because of its tendency to be present-centric. Some argue that because of forestry's long time horizons, lower interest rates should be used. Others maintain that the application of competitive interest rates allows for efficient allocation of scarce resources (although noted that looking too far into the future is not a realistic investment horizon).

If it is to be practical and relevant to forestry, financial analysis must be reasonable both in time horizon and expected interest rate. Financial analysis may have the most obvious practicality for short-term management decisions. When evaluating forestry investments over the long term (an entire forest rotation or beyond), consider financial principles as one of the many tools that can help guide decision making.

Perhaps the best way to approach the issue of compounding and discounting is to realize that even small investments made today, especially in growing trees, will yield enormous dividends for future generations in the form of both economic and environmental values.

Example 1: Harvest Now or Later?

You are deciding whether to harvest today or wait another 5 years. A harvest today will yield $8,000/acre, which you can put in your bank account at 5% interest. However, timber markets are forecast to improve such that in another 5 years you expect your timber to yield $11,000. Should you harvest now or wait?

Solution: Use this formula to determine compounding to a future value:

$$V_n = V_0 (1+i)^n$$

Where
V_n = Future value at year n
V_0 = Present value
i = Interest rate
n = Number of years

$$V_5 = \$8{,}000\ (1+.05)^5 = \$10{,}210$$

In this case, you would be better off to let your timber grow another 5 years when it will yield $11,000.

Example 2: Tax Savings

You enroll in a current use tax program that saves you $1,000 in property taxes every year. What is the present value of the savings over 20 years at 5% interest?

Solution: Find the present value of an annual series that terminates at 20 years.

Use this equation:

$$V_0 = a\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right]$$

Where
V_n = Future value at year n
a = payment amount
i = interest rate
n = number of years

$$V_0 = \$1{,}000\left[\frac{(1.05)^{20} - 1}{.05(1.05)^{20}}\right] = \$12{,}462$$

of money: $11,739 to be received 50 years in the future is worth approximately $100 today assuming 10% interest.

Applying the concept of compound interest to a forestry context, an investment in land and stand establishment 50 years ago would have to be valued at 11.47 times as much today (50 years later) if the landowner desires to earn 5% interest on that investment.

Assessing forestry investments

Net present value

Utilizing compounding and discounting is necessary when assessing forestry investments, as forestry is a long-term enterprise where costs and revenues occur at different times. Suppose a landowner invested $300/acre to establish a stand of Douglas-fir, spent $100/acre 15 years later to precommercially thin (PCT) the stand, generated $1,000/acre of net revenue in year 35 from a commercial thin (CT), and received $14,000/acre in net revenue when the stand was harvested at age 50. Over the course of the 50 years, $10/acre was spent every year on taxes and general maintenance. In terms of financial performance, it is not appropriate to take the total costs of $900/acre ($300+$100 + [50 x $10]) and subtract them from the total revenue of $15,000/acre ($1,000 + $14,000) to compute a net profit of $14,100. The reason this is not correct is because these cash flows occurred at different times and should be compounded or discounted to a common year and then compared.

Typically, all costs and revenues are discounted back to the present to establish a discounted cash flow. This can be done with a combination of single amounts and series. The net sum of the present value of the costs and the present value of the revenues is known as net present value (NPV). NPV allows an apples-to-apples comparison of costs and revenues that occur at different times.

Table 1 shows the NPV at 5% interest for the Douglas-fir rotation described above. Each cost and revenue has been discounted back to year 0.

Table 1. Net present value of an example Douglas-fir rotation at 5% interest.

Item	Year	Value	Present Value
Plant	0	-$300	-$300
PCT	15	-$100	-$48
CT	35	$1,000	$181
Harvest	50	$14,000	$1,221
Maintenance	annually	-$10	-$183
			Net Present Value: $871

If the NPV is positive, then the present value of the costs and the investment can be considered financially acceptable. Likewise, if the NPV is negative, the present value of the costs exceeds the present value of the revenues and the investment is considered financially unacceptable. When considering multiple acceptable alternatives, the higher NPV is preferable. Alternatively, a positive NPV means that the future revenues provide a return on the invested costs that exceeds the given interest rate. In the Douglas-fir example, the NPV at 5% interest is $871/acre, meaning that the revenues from commercial thinning and final harvest yield a 5% return from the money invested in stand establishment and PCT, plus additional returns equal to the present value of $871.

NPV is a useful tool for comparing management alternatives and guiding management decisions, including individual decisions such as whether to prune or thin, as well as overall management for entire rotations.

Interest rates

The NPV of an investment depends heavily on the interest rate used. The interest rate is also called the discount rate or the target rate of return. In the Douglas-fir example, a NPV of $871 results using 5% interest. However, at 10% interest the NPV is -$268. For a meaningful analysis, it is important to use a target rate of return that accurately reflects the investor's time value of money.

An appropriate interest rate depends on several factors. If you borrow capital to fund forestry activities, the rate of return should reflect the cost of that capital (the borrowing interest rate). If you want to invest existing capital, the rate of return should reflect the opportunity cost, which is the alternative rate of return that could be achieved elsewhere. For example, earning 5% interest from a mutual fund account could be used as

a benchmark to assess an alternative investment in forestry. Another factor is investment risk. Most people tend to be risk averse such that they demand a higher rate of return for riskier investments. The risks for growing timber include physical threats such as fire or storm damage, as well as socio-economic risks such as market fluctuations and changing regulatory environments.

Non-timber values

The focus on monetary benefits from growing and selling timber has been to simplify concepts rather than imply that non-timber benefits such as aesthetics, habitat, or enjoyment are less important. On the contrary, for many family forest owners these non-timber benefits are even more important than generating timber revenue.

Many hold the false perception that financial analysis and non-timber benefits are two different or even mutually exclusive ways to value forests. However, the same financial principles apply to non-timber as well as timber values. The challenge is in assigning the non-timber benefits realistic monetary values.

Because financial analysis is commonly misperceived to run counter to non-timber benefits, you may consider these decisions to be outside the realm of economics, when in fact you are making very economic decisions. You may not assign concrete monetary values to non-timber benefits or do a formal financial analysis, but rather make decisions intuitively. If you decide to delay or even forgo timber harvest, you understand that the non-timber benefits are worth more to you than the cash value of the timber.

Summary

Forestry financial analysis tools use the concepts of compounding and discounting to find common reference points such that costs and revenues that occur at different times can be directly compared. This can be particularly important for forest management because of its uniquely long time horizon.

It is important to emphasize that economic optimization is not limited to timber management, as financial analysis principles apply to both timber and non-timber values. The key in both cases is to make appropriate assumptions about input variables. As in any analysis, the quality of the outputs is only as good as the quality of the inputs. In situations where values are hard to quantify, decisions might be made intuitively. Ultimately, financial analysis tools are not intended to advocate for any particular management outcome, but reveal economic outcomes to individuals make informed management decisions. ■

Kevin W. Zobrist *is regional Extension forestry specialist for Washington State University, located in Everett. He can be reached at 425-357-6017 or kevin.zobrist@wsu.edu.*

Financially Optimal Timber Harvest Timing

Maximizing financial returns from your forestland investment

By WILLIAM E. SCHLOSSER, Ph.D.

People own forestlands for recreation, to support wildlife habitat, to have a place for solitude, and for various other purposes; financial investment returns eventually enter the picture, especially when annual property taxes or land payments are due, or when it's time to send the kids to college. Land and timber have separable values: timber can be harvested without compromising the inherent value of the land. Land retains its inherent value while the timber resource is converted to cash and another timber rotation is grown. Throughout this cycle questions remain about when it is the best time to harvest to optimize financial returns. Timber assets change in value because of tree growth and variations of delivered round-log prices to buyers (like mills). Trees must be harvested (logging costs), trucked to buyers (trucking costs), and the timber sale must be administered and the forest managed (overhead and administration). All of these factors determine net revenues to forestland owners. Harvest timing is an important decision for the landowner to contemplate, understand, and administer. "When should I harvest my trees?"

The question of the "right time" to harvest timber should receive considerable attention. Recently, there has been a flow of misinformation to forestland owners about delivered round log price trends, so it's important that landowners understand how log markets operate. A recent misleading statement across Northwest log market regions asserted that the March 2014 Douglas-fir 2 Sawmill log prices around $760/mbf "have been the highest prices ever recorded in this market."

The misleading part of this statement, and others like it, involves a time-factor difference between NOMINAL and REAL prices. Nominal prices are the prices we see every day for fuel or groceries, or commodities like logs; prices are recorded on the day transactions happen. After a price is recorded it becomes a Nominal price linked to the date it was used. To make this price comparable to a price paid at an earlier or later date, we need to restate our currency into constant terms such as today's value. When we make "time-dependent conversions" we are restating prices in Real terms—all prices are converted to the same version of currency. This conversion process provides us prices we can compare between dates.

If we want to compare the price paid for Douglas-fir 2 Sawmill logs in 1994 ($704/mbf-Nominal) with today's price (Real), we need to rely

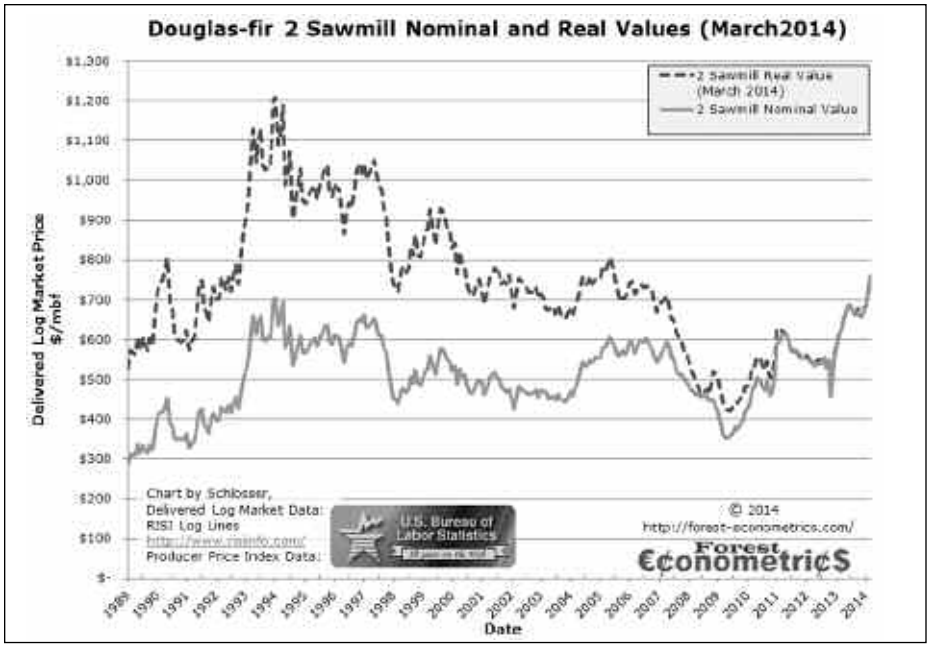

Figure 1. Douglas-fir 2 Sawmill delivered log prices, Real (March 2014) and Nominal, in the Puget Sound delivered log market area.

on a conversion based on the rate of inflation. The US Bureau of Labor Statistics releases a monthly Producer Price Index value to create price conversion factors from previous dates to a common currency.

In the example of Douglas-fir 2 Sawmill delivered round logs in the Puget Sound log market of Washington, the January 1994 price was $704/mbf. In Nominal terms the March 2014 price of $760/mbf looks like a $56/mbf increase from the price paid 20 years ago. But when these prices are stated in today's currency, the converted January 1994 price becomes $1,208/mbf (see Figure 1). In current terms, prices have a long way to climb before the "highest prices" will be seen in this market for Douglas-fir 2 Sawmill logs (and most other log sorts).

About 20 years ago, heated debates spread through our industry in this market area about threatened, endangered, and sensitive species management constraints (northern spotted owl) and riparian management zone considerations for anadromous fish (salmon). The market response combined with macroeconomic forces and generated a spike to delivered log prices culminating in 1993-94.

Since then, delivered log prices have been in a general devaluation trend in Real terms. As the "Dark Recession" troughed in June 2009, the constant dollar price for this commodity fell to its lowest point of the cycle at $420/mbf (Real March 2014 terms), or $358/mbf (Nominal June 2009). Devaluation response was reflected in the lowered price for this sort to only 35% of its peak price, in Real terms (Figure 1).

Delivered log markets experience short-term "shocks" and "random noise" events that rapidly pull prices higher or push them lower. If we look only at brief periods (about a year or less) shocks can be misinterpreted as long-term trends.

Delivered log market trends are shaped within global and local economies. One particular trend prediction system is called the "Real Price Appreciation (RPA) Forecast Tool." I developed this system with a col-

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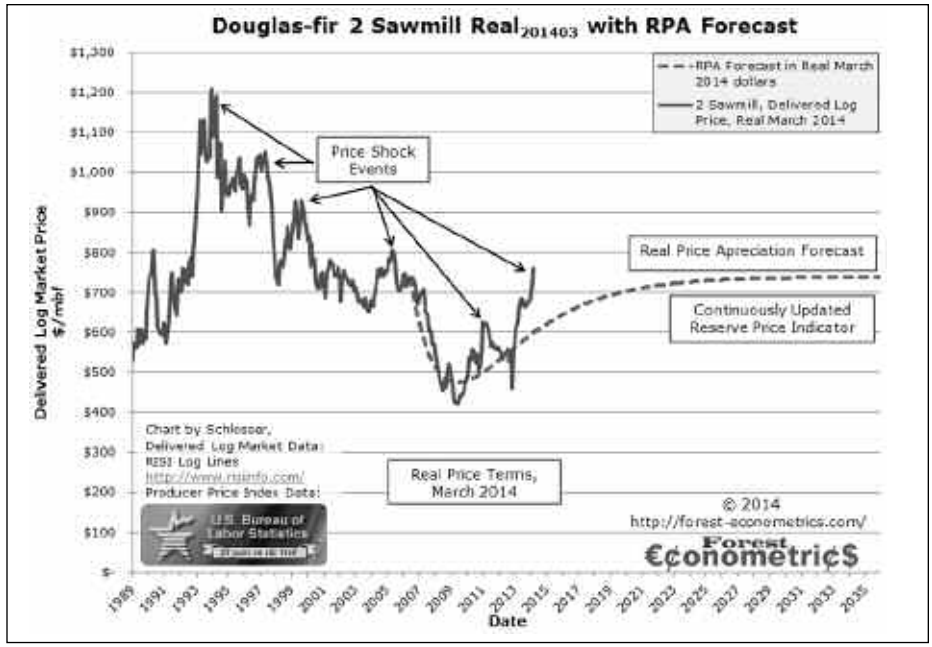
league, Dr. Wandschneider of Washington State University, using real log prices to recognize: a) an initial period of price stability; b) a disruption event and its turning point; c) the market's correction response; and d) the price recovery journey (see Figure 2). As a general statement, the recovery period will take longer than the movement from "stability to disruption event's turning point." The price recovery trend is seen as a mean-wandering "random walk" model in price forecasting with a return in "Real terms" to the price when the initial disruption event took place as reflected on the dashed-line curve in Figure 2. The cycle started with a price of $740/mbf (March 2014 terms), devalued in 2009, and is in an appreciation recovery phase currently with the destination in about 2020 at the starting point price ($740/mbf in March 2014 terms). People familiar with investment timing strategies may recognize RPA Forecast Tool predictions as "Reserve Prices"—sell above the line, hold below it.



Studying Figure 2: Current prices in this log market region are above the RPA Forecast Tool's prediction trend by about 21% (prediction $600/mbf, current $760/mbf). This current cycle's last significant market devaluation shock occurred November 2012 as nominal prices dropped to $457/mbf nominal ($461/mbf Real March 2014 terms): a 16% price drop in one month. Upward price spikes and downward shocks around the price cycle trend are normal events within log markets. Matching your growing timber volume with favorable price trends can bring strategic revenues. Missing on these price trends means you have forfeited potential profits.

To put this prediction tool's use into perspective, consider the solid line in Figure 2 showing the monthly updated delivered log prices (in Real terms), and the dashed line showing the trend's Real price prediction. As of March 2014, prices in the market were above the prediction (it is a market shock event), and the decision to harvest timber that is near, or at maturity, is a good financial move to make. Conversely, in November 2012, delivered log prices were in a "below-market prediction" position (random noise), and the decision to harvest timber was best delayed. Unless the bigger picture of price histories and price forecasts are available, the log seller may see the March 2014 prices as the start of a new steeply climbing price trend, or they may see the November 2012 price as "up" from just three years earlier: in both cases the interpretation would be in error.

In reality, each property has a different mix of tree species, and depending on the market area the property is located in, the number of sorts may be few or many. Each delivered log group has its own market response profile and must be understood if optimal profitability is to be achieved. The strategies to increase the financial side of selling timber can extend your extensive forest management activities into highly profitable results.

Synchronizing market trends with forest growth cycles creates useful information for timber harvest planning. If prices are climbing as the timber stand is rapidly growing, the decision to harvest will logically be postponed (both factors are increasing). If timber growth slows, as it usually does when the timber stand matures, and price trends flatten out, or turn to a devaluation cycle, the timber should be harvested before the devaluation event eats away at your profitability margin. These situations are rarely seen as black and white interpretations: a price shock may lift prices in the short term and drop them again during the ensuing months. Price shocks can happen in response to new product markets, closure of markets, international trade complications, or dramatic demand changes for the wood products made from the timber we grow. Directly, increased new housing demand in the US can be felt as price shocks in the short-term for delivered round log market deliveries. Furthermore, not all species and log sort prices track along the same price trend cycles: Douglas-fir and western hemlock in the Puget Sound market are closely related in their current price

appreciation cycles, but western red alder sawlog sorts are currently in a devaluation response. All pulp log sort prices are currently moving opposite softwood sawlog sort prices: month-to-month price changes are in a devaluation cycle.

Forestland owners face an eternal conundrum of how to balance market timing with forest growth realities. As long as you keep "timber on the stump," you are holding potential conversion profits against future volume and value combinations. When you hold logs on the stump, your options are many but your realized profits are zero. If prices peak to higher levels and timber is ready for harvest, then the capture of windfall profits is attainable (great combination). If the market prices are shocked to a price drop, and you are not able to capture the higher price as you harvest your timber, you have lost potential gains (unfortunate combination). When you do decide to harvest the timber and deliver it to your destinations of choice, your timing options have ended: reality takes over.

As you seek to maximize profits, you might harvest your timber earlier than the timber stand's culmination of mean annual increment as a hedge against holding your timber to a point when prices enter a market devaluation trend. Timber stand volume may be less than biologically optimal, but higher prices may support the total value (volume x price) of an early harvest.

The other side of this hedge may be seen by holding timber stands until very nearly at, or past, the biological optimum to match it with price appreciation trends and favorable shock patterns—like current market prices. The market is about 20% above RPA Forecast Tool's price trend predictions currently (March 2014), and if the timber is mature and ready for harvest, this is an opportune time to send your logs to market. If your timber is more than about 10 years from biological maturity, the decision to harvest may be best postponed. Markets will change, macroeconomic forces will alter, and conditions will be different in another decade. The trend we are currently in may continue for another 10 years, or it may collapse and be replaced by a new trend with appreciating or devaluing prices. It is a gamble: If you were facing a similar situation 10 years ago, in 2004, you might have decided to hold your timber as the stable market trends looked promising for continued price growth; two years later in 2006 price trend cycles experienced a drastic disruption to trough in June 2009 with the Dark Recession dropping prices (devaluation) about 50% in Real terms.

When you harvest timber now, your next market timing opportunity will be after another several decades—so make it count!

I predict the current price trend for Douglas-fir sawlogs (e.g., 2 Sawmill) that started in June 2006 with a devaluation event that troughed in June 2009 and is currently in an appreciation recovery cycle, will continue through about 2019-2024 (another five to ten years), and the Real price in today's terms will be realized at about $735/mbf. Between now and then we will see several price fluctuations (positive and negative), and another trend cycle will probably be introduced.

As forestland owners manage their assets, topics of forest health, wildfire risks, regulatory compliance, revenue generation, and forestland taxes combine to present a formidable mix of divergent considerations. Whether you manage your timberland asset personally or with a forestland consultant, I strongly recommend that you consider market analyses for all your timber stand sorts like those shown here for one species sort in this example market (Puget Sound). Watch market trends in Real terms, anticipate their fluctuations, and fit them to your timber asset realities. Prices for each timber sort follow a different trend pattern. Understand each timber stand's growth and yield profile and make strong financial timing decisions about each timber stand's harvest date: you are seeking the financially optimal combination of volume growth and prices. You may only get one harvest decision opportunity every several decades on your property—so make it count! ■

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The Realities of an Owner-Managed Timber Harvest

By MARIE GALE

Our family-owned timberland is located at the southern end of Coos County, Ore. The property has been in the family, in some form or another, since the early 1900s and is currently owned by three generations of women, aged 19-79. Since none of us were trained in forestry/timber management, in the past we either had a forester manage all aspects of a harvest for us or we sold the timber on the stump and didn't have to address the details ourselves.

This last summer we completed a timber harvest on about 18 acres that we managed ourselves. As operations manager for the family (and recently certified Master Woodland Manager) I took on the tasks of getting purchase orders for the logs, contracting with the logger, arranging trucking, and determining where to send what. This article will share some of the realities of that timber harvest.

PHOTO COURTESY OF JERE MATLOCK

Three generations of women manage the Chandler Family Ranch and share in the decision making.

Deciding on the harvest

In most circumstances, there is some advance planning on when and where a harvest will be undertaken. In this case, the harvest was neither planned nor expected. In fact, this little corner of our property is essentially inaccessible from our adjacent land and behind a little ridge so we can't even see it.

The 40-acre corner is the tip of our very irregularly shaped property. It is adjacent to BLM land on one side and on two sides by land owned by a commercial timber company with whom we have been working to restore good neighbor relations. In the early spring the company called, asking if they could come on our property with an access road for a few hundred feet, and pointing out we had some marketable timber back in there. They even gave me the name of their logger in case we could work something out with him (since he would already have equipment in there).

I contacted the logger and started the process of figuring out if we could viably do the logging and get a market for the logs coming out.

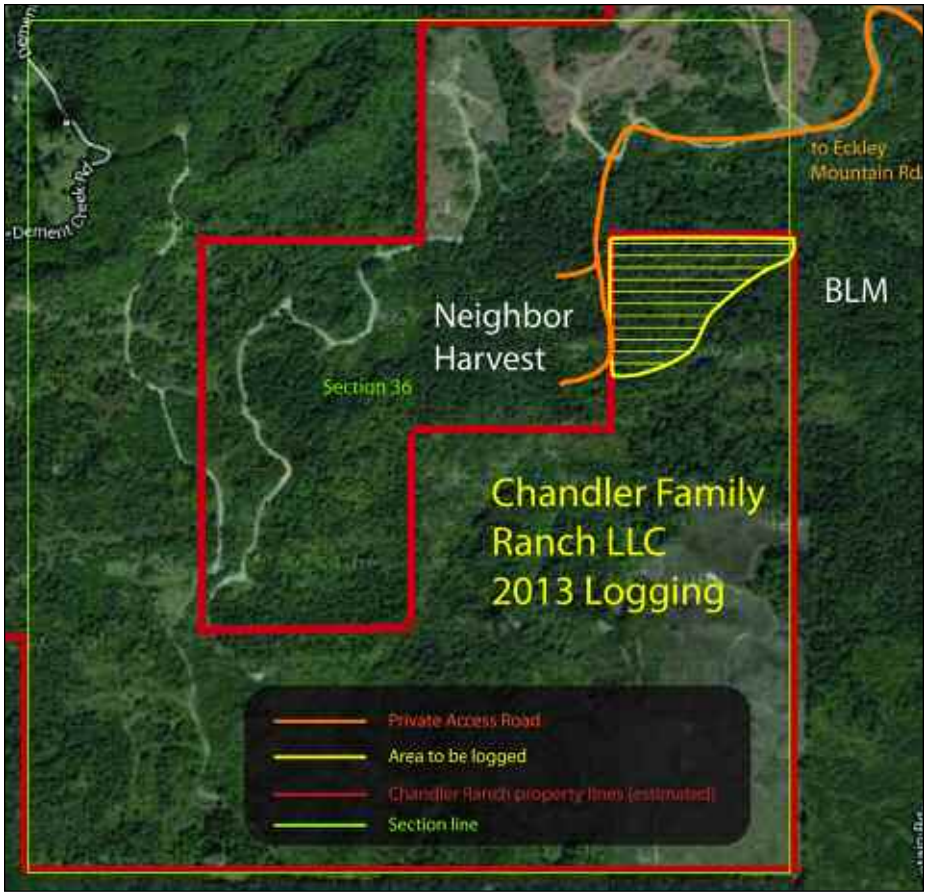

PHOTO COURTESY OF MARIE GALE

Eighteen acres of timberland were harvested off the Chandler Family Ranch in Coos County. The owners managed the harvesting on their own.

Getting purchase orders for the logs

I got the names of the local log buyers from our OSU Extension forester, Tristan Huff, and hit the phones. Somewhere I had gotten the idea that it was difficult for small landowners to get purchase orders from local mills, which turned out to be absolutely untrue. Every buyer I spoke with was knowledgeable,

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Owner-Managed Timber Harvest

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friendly, and willing to take a little time to explain the processes and prices to me.

All of the buyers wanted to come and look at the stand before issuing a purchase order. Having completed the Master Woodland Manager class, I was somewhat familiar with the process of getting purchase orders and what to look for, but getting into the nitty-gritty with the buyers as we walked through the stand was very informative. Each buyer took the time to explain what they were looking for (size and shape of the trees) and to estimate the quantity of timber. In addition to mills looking for logs for dimensional lumber, I also had a buyer for poles come and look at the stand. Timber for poles fetches a much higher price, but it must meet very specific standards. The pole buyer walked through the stand explaining why trees did or did not meet the criteria for poles. It turned out we didn't have a high enough percentage of pole trees to make it worthwhile, but it was a very educational process.

In the end, I got purchase orders from three mills to start with, and then two other mills a little later on during the job. Prices per thousand board feet (mbf) ranged from $480 to $580 for white fir and $510 to $680 for Douglas-fir. Alder saw logs were $59/ton and mixed conifer pulp was a mere $25/ton.

The original purchase orders were good for 30 days. In reality, the logging job took longer than that due to weather and other delays, which meant I had to get new purchase orders. I thought it would be a difficult process and that the prices would likely go down, but it was easy—just a simple phone call—and in fact the prices went up from July to September!

Contracting with the logger

As I was getting purchase orders, I was also working on a contract with the logger. We walked through the stand and talked about how he would carry out the logging, what would and would not be left standing, potential issues, and expected time frames. After our discussions, I was comfortable that I would be able to work with him and we were on the same page about what needed to be done.

Taking into account my expectations, as well as the fact that he already had his equipment on site, we settled on a price of $23 per ton *or* $175 per mbf, at the discretion of the owner (we ended up paying by both ton or mbf based on how the mill paid us as it was easiest to calculate that way). The contract included that the logger would arrange for the trucking, but that the trucking would actually be contracted and paid by the owner.

PHOTO COURTESY OF JERE MATLOCK

Marie Gale conducts a burn on the Chandler Family Ranch as part of a 30-acre oak savanna restoration project.

Trucking

Due to the distance from the mills and the current price of fuel, trucking turned out to be a significant part of the total cost of the job. Price to two of the mills was $10 and $15.10 per ton respectively, to another mill was $372 per trip, and yet another was $92/mbf. On average, trucking worked out to about 16% of the price at the mill based on the final dollar figures.

Falling, bucking, and sorting for the best price

The hardest part of managing the job was trying to work out how to maximize the profit per load. With purchase orders from several different mills, we had an opportunity to maximize the amount received per log and per load. I provided the POs to the logger, but it came down to relying on the expertise of the faller and sorter to buck and sort to get the best prices for us. It was a bit problematic in that our payment to the logger (and the logger's payment to the faller) is based on mbf, and not on the best price, so

there's no financial incentive to the logger or faller.

My review of the first set of payments from the mills found that there were a few loads to one mill that contained logs that should have gone to a different mill to get a better price. In fact, that little error cost us over $1,000.

On the other hand, toward the end of the job, our logger noticed that the type and quality of wood they were taking out from a small section might get a better price from a different mill. I contacted that mill, got a purchase order and we did, indeed, get better prices for those four loads of logs.

Record keeping

In the early stages of the project, keeping track of all the activity looked like it was going to be a nightmare. To handle it, I set up a spread sheet (one line per load) to track all the information. As I received payments from the mills, I entered in the amounts from each load (load and/or scale ticket number, quantity in tonnage, mbf or both, and the payment amount) and as bills from the truckers were received, they were reconciled against the tickets and amounts from the mills. With all the data entered, I was able to verify all aspects of the job, knew that the amounts paid to the truckers were correct, and could pay the logger per the contract.

Economic nitty-gritty

During the course of the job we took out 59 loads; all were sawlogs. Because the cost of pulp wasn't even enough to cover the logging and trucking, no pulp loads were removed. The average amount paid by the mill per load was $2,200, with trucking and logging averaging $352 and $682 per load, respectively.

Over the years I've often read that gross profit (revenue less logging and trucking) should be around 50%. In past years when using a professional forester or selling stumpage, our actual numbers tended to be more like 37% to 42%. Doing it ourselves, the gross profit worked out to just about 53%.

Additional expenses included Forest Products Harvest Tax ($763) and Small Tract Forestland (STF) Severance Tax ($1,167). And, of course, we have the future financial obligation of replanting and releasing in order to comply with the Oregon Forest Practices Act.

Looking at it on a per-acre basis, we harvested about 18 acres, giving net revenue of about $3,738 per acre (after taxes).

Next time

If I were to do it again, there are a few things I'd do differently.

First, I would ensure that I had all the possible purchase orders in hand before starting. We lost out a little in the beginning by not getting prices from a more distant mill that ended up having better prices even with the higher trucking costs.

Second, I would try to get a price on logging (and trucking, if possible) that was based on the price received from the mill in order give an incentive to the logger to fall, buck, sort, and deliver the wood in the way that gets the best possible price.

Third, I would ensure that there were provisions in the contract with the logger for special pricing for pulp loads in order to ensure that the pulp could be removed in a way that worked for all concerned.

And lastly, I would conduct at least weekly on-the-ground inspections of the on-going operations. Shortly into this job I injured my knee and was unable to get out to the site to inspect personally. While I felt reasonably confident of the job being done correctly based on reports I received from the logger and others looking in for me, it would have been much better to be able to personally inspect.

All-in-all, it turned out to be much more profitable to arrange the logging myself rather than do it through a forester or to sell the stumpage. I must admit, though, that we were pretty lucky in the opportunity to use a logger already on site, which could make a difference in a situation when selection of an otherwise unknown logger would be part of the process. I would definitely take this approach again. ■

Marie Gale *is one of the owners of the Chandler Family Ranch, which includes just over 1,300 acres of mostly timberland that has been in the family since the early 1900s. The property (through Chandler Family Ranch, LLC) is owned by eight women spanning three generations, all descendants of the original homesteaders. Marie has lived on the property since 1997 and has held the position of operations manager for the family since 2003. She served as the president of the Coos Curry Small Woodland Owners Association in 2009-2010 and completed the Master Woodland Manager training through OSU Extension in 2012. She can be reached at hello@mariegale.com.*

Rocking Roads: Does it Pay?

By STEVE BOWERS

Most logging operations conducted by small woodland owners occur during the dry season. One explanation for this is because, while log values are historically better during the wet season, many cannot capitalize on these values due to the absence of rock roads capable of withstanding the rigors of 80,000-pound log trucks.

So why not rock your roads and log during the winter months when prices are higher? Or are they? In a 2010 research study, Douglas-fir log values were examined over a 15-year period, beginning in 1994 and concluding in 2009. The year 1994 was chosen as the beginning point because timber harvest volumes by ownership (diminishing federal harvests and increasing volumes on private lands) more closely resemble the percentage of total harvest levels in western Oregon at the present time.

The wet months are considered to be from November through May, while the dry months include June through October. It is important to note that over the 15-year span of the study, early June and late October would have been officially noted as a "wet month" with woodland owners unable to access timber stands if relying on unsurfaced roads. If we consider January through May as wet months and June through October as dry months, the percentage difference in log values is 2.3%. Using real log values for each year, unadjusted for time, the result is a net increase of $14/mbf.

Which begs the question: based on these higher prices, can I afford to rock my road? Rock roads can be constructed with varying rock widths and depths. For the purpose of the study, costs of upgrading a pre-existing road consisted of applying 12 inches of non-compacted, durable rock. Various factors affect the depth of rock necessary for a logging operation and discussions with various loggers, engineers, and timber managers suggested a depth ranging from 9 to 14 inches, with a 12-inch depth being the most accepted level by industry and the Oregon Department of Forestry.

A 12-foot running surface was the minimum running surface suggested by all the contacts, thus a 12-foot road with 12 inches of aggregate requires a total of approximately 44 yards of rock per station (100 feet). If we include an additional 1/2 load of rock/station to account for turnouts and widened turns, we will need a total of 50 yards of rock/station. Keep in mind every operation is unique, but for the purpose of the report, we decided a quarry was within 10 miles of the operation, trucks cost $60/hour and rock $7.50/ton (approximately 13 tons or 10 yards/load), and an average cost of $155/load. This equates to a cost of $7.75/foot of rocked road based on a 12-foot running surface.

It was also determined a pre-existing road required surface preparation before hauling the rock, at a cost of $100/station ($1.00/ft.), equating to a total cost of $875/station or $8.75/foot. Based on the increased value of $14/mbf, rocking a quarter mile of road to access the timber requires 825 mmbf of logs, a half mile requires 1.65 mmbf, and so on. You might "get by" with substantially less cost and volume of rock discussed in this study, but don't count on it. It should be noted that individuals assigned the duties of estimating costs involving rocking roads almost always underestimate these expenditures.

Although a 12-foot running surface was the recommended road width by those involved in the study, "real-life" examples abound where narrower roads are successfully utilized in wet-weather operations. Table 1 displays a number of options for consideration. Keep in mind each operation is unique in terms of seasonal conditions (how much rain), site conditions (soil types, topography) and operational conditions (harvest volumes).

Remember, the stated volumes are based on the percentage difference between wet and dry season log values. An examination of the monthly variances revealed that if the woodland owner had capitalized on the highest wet season, monthly value

Table 1. Various costs for a range of road specifications.

Surface preparation	Running surface	Rock depth	Cost per station
New road	16'	12"	$1,319
($300/station)		all rock costs estimated at $15.50/yard*	
New road	12'	12"	$1,081
New road	12'	9"	$889
Upgrade ($100/station)	16'	12"	$1,112
Upgrade	12'	12"	$875
Upgrade	12'	9"	$682
Upgrade**	10'	12"	$755
Upgrade	10'	9"	$593

*Subgrade ratio of 1:1 and non-compacted rock depth.
** Minimal requirements for large-volume timber removal.

PHOTO COURTESY OF STEVE BOWERS

A "classic" design of new road construction is a lift of 6 to 8 inches of large, open rock (3"-6"), followed by a lift of rock containing "fines" (3/4" to 1-1/2") applied as a running surface.

versus the entire 5-month dry-season average, the percentage difference would have been approximately twice as large as the study, thus half the required timber volumes (412 mmbf and 842 mmbf for a 1/4 and 1/2 mile road, respectively) to pay for a rocked road. This percentage may be a better indicator of an expected additional return on a harvest operation.

Furthermore, if each year's highest monthly log values are compared to the lowest monthly values, the timber volumes required for a rocked road comes within reach of many more woodland owners. A caveat to this figure is the assumption the seller harvested at each year's highest prices compared to the year's lowest. Reality suggests the average woodland owner much more often hits the annual lows versus the highs merely because most landowners are working only during the dry season. The graph below shows the average monthly prices from 1995 to the present.

But for the sake of argument, consider the annual percentage difference between the highest and lowest monthly log values. Since 1995, there is a 17.3% difference in the high versus low values. Based on an average Doug-fir log value of $610/mbf over the time of the study, this equates to $115/mbf. According to these numbers, the log volumes required to rock a 12-foot running surface, 1/4 mile and 1/2 mile road, are approximately 100 mmbf and 200 mmbf, respectively; vastly smaller volumes than those suggested in the study. Realistically, the answer resides somewhere in-between. Regardless of how the statistics are represented, there is no doubt woodland owners will procure additional revenue if they perform their timber harvests during the wet season.

While many woodland owners do not have sufficient timber volumes to pay for these roads, the environmental considerations of durable, rocked roads warrants consideration. Additionally, rock roads enable woodland owners year-round access for reforestation projects, timber stand improvement activities, fire protection and suppression, and recreational opportunities. There is also a growing interest and potential for fee operations involving recreation and fishing and hunting activities during wet weather. Finally, regulations governing the use of woodland roads are becoming more restrictive, primarily due to water quality, so looking at the "big picture" these rock roads may well be a factor in future governmental regulations/restrictions on woodland road usage. ■

PHOTO COURTESY OF STEVE BOWERS

Rock is normally paid by the load (material and trucking costs in one price) determined at the time of purchase. Each load is the same price, even though there will be slight differences in the volume (weight) of rock and trucking distances. Another method is to pay for each load of rock in addition to the time involved in the trucking, then adding each of the deliveries for a final cost.

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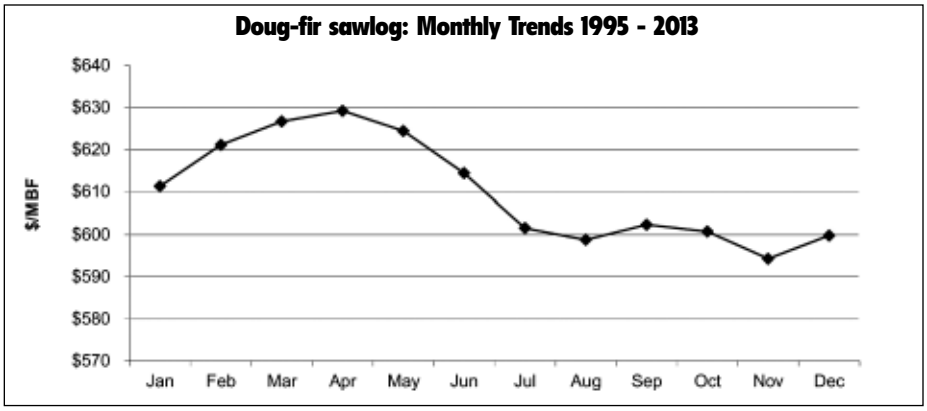

SOURCE: STEVE BOWERS

PHOTO COURTESY OF STEVE BOWERS

Before purchasing your rock, be sure to visit the quarry and ensure the rock is of high quality—containing limited amounts of dirt and excessive fines. Try to keep the dirt and fines limited to less than 5% of the total.

Tractor Ownership: The View from Above

By VAN DECKER

As a woodland owner, your work is never done—there are always trees to clean up following a wind storm and roads to maintain through the years. For many of the tasks that you find yourself undertaking, a tractor is a necessity that helps you complete work quicker and easier. However, several important deliberations should be made before expanding your equipment portfolio.

While the appeal of owning forestland for many is the opportunity to work out in nature and do the work yourself—whether building a road or performing small-scale logging—be honest with yourself about how often you expect to do this work. If you anticipate building a road or yarding a few wind-thrown logs to a landing every other year or every five years, then consider either contracting out these operations or renting a tractor. Not only will you save money if you contract out these operations, but an experienced operator can complete these jobs quicker and cheaper.

Also consider your experience in operating machinery. Small woodland owners have diverse backgrounds and not all of us have operated machinery before. That's not to say a bit of practice can't make you comfortable, but driving a farm tractor through the woods is very different from driving a crawler tractor. It can take several years to become an experienced operator and complete jobs in a timely manner.

PHOTO COURTESY OF VAN DECKER

Ann Decker yarding logs on their property near Corvallis, Ore. Note the side and rear screens that provide protection from limbs.

But if a tractor is a much-needed piece of equipment to add to your portfolio, then consider how you will be putting it to work over the years. Will you be yarding logs, digging ditches, or bushwhacking new trails? There are two different types of tractors—wheel and crawler—and your uses will determine whether you need to add additional features to the base model. The three main brands to choose from are John Deere, CAT, and Case, and a 50-60 horsepower model should meet your needs.

PHOTO COURTESY OF VAN DECKER

This John Deere 550 is the Decker's choice of cat. The six-way blade makes for more efficient dozing of dirt and decking logs.

PHOTO COURTESY OF VAN DECKER

A Case 850 cat is used to yard logs. Note the attached arch above the drum.

For bushwhacking, the four-wheel-drive wheel tractors aren't good for cutting through brush since there isn't a protective shield around the cab, while the crawler tractor has armor plates and a screened cab. Yarding logs requires the additional features of a drum on the back with a winch-line to reel in the logs and an arch on top of the drum. A drum line size of 1/2" or 9/16" will suffice for most of your hauling needs; a 3/4" cable will give you all the strength that you need (and more). If building roads is your

goal, your tractor should have a six-way blade that allows you to angle the blade as needed and provides for efficiency.

Once you have decided which tractor will best meet your needs, the next question is whether to buy new or used. I have looked at new and used tractors over the years, and while I can't say one is better than the other, if buying used, it is important to talk to the person who owned it to find out how they used it. Dealers will provide an equipment evaluation form that includes a thorough appraisal of the machinery, detailing information such as wear points and usable life. Whether buying a new or used tractor, always ask for the opportunity to drive it around and try it out. One critical consideration when selecting a tractor, apart from the drum and winch line features, is safety and convenience—including mobility and how easy you can get on and off the tractor. In a Deere 450, you sit down in a hole that you have to get up to get out of it, while the Deere 550, with its flat deck, makes it easy to get off of.

The price tag of tractors can run between $20,000-$50,000 for a used and nearly $100,000 for a new model. Unless you expect to use your equipment a lot, purchasing new might not be the best route. However, for tax purposes, the 179 deduction does allow you to write off the full cost of new machinery. Buying used allows you to write off the depreciation for five years, but consult your accountant for the best advice to maximize your deduction.

Tractors can take a lot of abuse and operate for years until something breaks. I've known some machines that are over 30 years old, and after being rebuilt, are still in use. However, you should be prepared for an expensive bill when your tractor requires repairs. A visit to the shop will likely be needed once every five years and you should expect a bill of at least $5,000. Depending upon how comfortable you are maintaining equipment, you can perform some routine upkeep yourself, such as changing the oil. For maintenance, you can take the tractor to the dealer's shop or find a mobile mechanic who will visit your place to perform the work.

When you're ready to make the investment in a tractor, conduct your research to ensure you're purchasing the model that will not only meet all your forestland needs, but that you are comfortable driving. Then enjoy the view from up high as you drive around your forest! ■

Van Decker *is an active member of the Benton County Small Woodlands Association near Corvallis, Ore, and can be reached at vadecker@peak.org. He would like to thank Seattle-area freelance writer Andrea Watts for help in writing this article.*

Paying Your Logger: $/mbf versus percentage

By STEVE BOWERS

Values for Douglas-fir sawlogs are higher than they've been since the mid-1990s. As a matter of fact, we are nearing historic highs for Doug-fir, eclipsed only by the domestic and export spike in prices during the height of the spotted owl controversy in 1993-1994. For many small woodland owners this comes as welcome news, although for the vast majority of you, if indeed you are considering a timber harvest, you are likely "gearing-up," waiting for the rains to recede and the roads to dry, thus enabling access to your timber.

Irrespective of log values, small woodland owners harvest during the dry months primarily because they cannot afford durable, rocked surface roads. Over time, an analysis of the variance in log values throughout the year(s) reveals a consistent, definitive price increase during the late winter/early spring months followed by a decline in values during the remaining annual, dry period. Woodland owners do not take advantage of these market conditions because, for most, there are insufficient timber volumes to justify the up-front costs associated with rocking roads (see separate article on page 20).

If a woodland owner can, and does, take advantage of stronger markets, is there a correlation between log values and logging costs, i.e., does the logger get paid more because the landowner is getting paid more by the mill? If so, it should be based on the concept of supply and demand: mills are offering more $/mbf (thousand board feet) in their demand for logs, correlating to an increase in the supply of logs from the landowner and the need for a logger. Loggers can, **and will**, demand more money for their services if there is an increase in

PHOTO COURTESY OF STEVE BOWERS

If utilizing all of the wood in a logging operation, today's firewood values greatly exceed those of chips. If the owner has the time and energy, cutting tops and defective wood into firewood versus chips can greatly enhance the financial value of the operation.

market activity. Loggers can, **and might**, obtain more money based on an increase in market values. Woodland owners cannot regulate the supply of loggers, but you can, **and should**, regulate the pricing structure on how these loggers are paid for their services.

Logging contractors are paid in various ways: by the job, hourly, daily, a percentage of log values, or $/mbf. Traditionally, the vast majority have been paid on a percentage basis or $/mbf, with the percentage basis being in the majority. Before we precede, anyone having performed a timber harvest and was satisfied with the method of payment to the logger, then all is well. We have no qualms if both parties in a contractual agreement are satisfied with the results, but hear us out, nonetheless.

Contractors bid jobs based on their fixed and variable costs, and a profit ensuring they remain in business while providing a profit for themselves. Logging contractor job estimates are based primarily, not exclusively, on tree size, total volume, topography, hauling costs, and equipment: the "things" they need to perform the operation, along with the various factors unique to a timber stand. What should not be a factor in estimating the cost of doing a job is the market.

Does a landscaper charge for mowing a yard based on the value of the home? How about a farrier shoeing a horse based on the animal's value? Does the auto detail person charge more to wash a Honda than a Cadillac? Extrapolate the logic of the argument by submitting the logger should not base the cost of a job based on the value of your timber. Historically, logging on a percentage basis has been the norm. And we know that old habits die hard, particularly among a demographic group (loggers) where many in the occupation are multi-generational participants and many of their clients (woodland owners) are advanced in years.

Consider the premise of paying on a $/mbf versus percentage of timber value from the logger's perspective. The most frequent argument is if they have an incentive to do a more efficient job, i.e., felling and bucking logs to maximize value, they receive a percentage of the revenue. This provides an incentive to make as much money as possible because they "have a dog in the fight." The logger and landowner are "equal partners," both motivated by maximizing the value of each log based on the specifications of the purchase order(s). This is a specious argument.

Why? Because loggers are a production-oriented business. Their definition of success is how much wood they can "move" in a day. From the logger's perspective, at the end of the day a bigger deck of logs is better than a smaller deck that has been bucked to take advantage of quirks in the Scribner Volume Table. A more careful application of bucking to maximize scale (based on today's purchase orders, there is an extremely close correlation to volume and value) will generate more revenue to the landowner…at the logger's expense of time and energy.

Note: this is not disparaging loggers or their incentive(s) for doing a "good job." Successful loggers have felled and bucked enough timber to have a good understanding of log length and diameter combinations that maximize revenue, and small woodland owners should expect these results. What woodland owners cannot, or should not expect, is a logger to make excessive measurements on an individual tree, hoping to gain an additional 10 board feet in a log or "tape-out" the entire stem before

–Continued on next page–

bucking to utilize the entire length. Without further elaboration (this is a subject for another day), maximizing the entire merchantable length of a tree stem, especially in larger timber, is one of the worst things you can do if maximizing revenue is your primary objective. And it should be!

Thus far, you have received qualitative opinions on the argument of $/mbf versus percentage, but "where's the beef?" or rather, "show me the money!" Several years ago, Oregon State University did research on a log bucking system, *BUCK*, that optimized the log selection in an individual tree. The system proved too cumbersome, requiring too many measurements and data entries, even by the most detailed-oriented individuals. In research, the results of bucking patterns by several experienced timber fallers were compared to *BUCK*. Based on total revenue, *BUCK* surpassed the feller's results by approximately four or five percent.

This would correlate to a difference, calculated by today's Douglas-fir log values, of $30-$35/mbf. None of the fellers used in the study came within two percent of *BUCK*, thus, under the best of circumstances, a logger might be able to procure an additional two percent return if they spent the additional time and energy in an effort to increase revenue to the landowner (and themselves if working on a percentage basis): in money terms, an additional $10 or $15/mbf, based on current log values. But they won't—too much time for too little results. And you can't blame them.

How about a "real-life" approach? The past few years, there have been no substantial increases in equipment, fuel and labor costs, resulting in negligible changes in logging costs. Two years ago, a woodland owner obtained bids from two logging contractors. The first logger bid the job for $250/mbf. The second logger bid the job at 45% (he will receive 45% of the amount the mill pays the landowner for the logs). Douglas-fir sawlogs were valued at $550/mbf at the time of the sale (these are accurate values for 2012). Based on a mill value of $550/mbf, the logger that bid 45% would receive $247.50/mbf if the landowner selected them to do the job. The landowner decided not to perform the sale.

Fast forward to today. Douglas-fir values have increased to $750/mbf (again, these are accurate, real-life values). The landowner contacts the same logging contractors. Once again, the first logger bids $250/mbf. And again, the second logger submits a percentage bid of 45%. Based on current values of $750/mbf, the percentage bid of the second logger correlates to $337.50, an increase of $87.50/mbf due to the increase of value of the logs. Logic would dictate the landowner wondering why the second logger wants an additional $87.50/mbf when the only factor having changed is the value of the timber. Precisely the point! In short, markets **have nothing**, and **should have nothing**, to do with how much you are going to pay the logger.

In summary, many small woodland owners perform very few timber harvests over a lifetime. Too many times, too many rely on antiquated information—information that was passed down through the generations by individuals who obtained their information the same way, which exacerbates the issue. This "knowledge by proximity" (believing something to be true merely because it has been stated or read over and over again) is one of the greatest intellectual faux pas. And if you are not interested in the intellect, think about the ramifications on the pocketbook: an interest to all parties. ■

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Study Tour to Explore Chile

Chile is a country of high mountains, dramatic coastline, deep forests, picturesque towns and dynamic cities. Explore Chile with Oregon State University Extension educators Max Bennett and Nicole Strong as part of an OSU Forestry and Natural Resource Study Tour. The tour is planned for November 2-11 and is hosted by Anglatin Travel.

You will meet with small woodland owners and walk their lands, visit world-class wood products facilities, step into stands of trees growing faster than you ever thought possible, and stands where you can name 14 species just within eyesight. Join us as we learn about one of the world's most innovative forest sectors and a growing conservation movement, all the while digging into the rich history, culture, art and cuisine (including some wonderful wines) of Chile.

This Oregon State University Forestry and Natural Resources study tour is designed for woodland owners, forest managers, and other natural resource professionals, students, and anyone interested in learning about the forests and forestry in Chile, one of the world's most dynamic and beautiful countries. The 10-day tour will expose you to a varied cross section private and public forests, wood products facilities, communities, and Chilean landowners and managers. You will visit fast-growing plantations and native temperate rain forests, and gain an appreciation for the country's culture, history and landscapes. You will come away with new ideas, new perspectives, and a better understanding and renewed appreciation for forest management in your home area.

Visit http://international-programs.forestry.oregonstate.edu/chile-forestry-study-tour for information on registration, cost, background information, and other resources.

If you have questions, please contact either Max Bennett at max.bennett@oregonstate.edu, or Nicole Strong at nicole.strong@oregonstate.edu. ■

TreeSmarts: Forest Research You Can Use

TreeSmarts: Forest Research You Can Use appears in every other issue of *Northwest Woodlands*. Column editor Ed Styskel reviews research being conducted from a host of sources, sorts through the items of interest to family forest owners, and provides a short summary of the pertinent results in understandable language. If you have a suggestion to share with Ed, please contact him directly at edstyskel@gmail.com.

Mastication: A Fuel Reduction and Site Preparation Alternative, authored by J. Halbrock, R.T. Graham, T.B. Jain, and R. Denner. 2006. Pgs. 137-146 in Proceedings of the 29th Council on Engineering Conference, Coeur d'Alene, ID, July 10-August 2, 2006, W P. Chung and H.S. Han (eds.). Online at www.treesearch.fs.fed.us/pubs/29062. (0.77 Mb)

Slash created through harvest or fuel reduction treatments is usually treated to reduce fire risk and/or prepare sites for the establishment, growth, and survival of new seedlings. Treating activity fuels and preparing sites for planting can be conducted through the use of machinery, prescribed fire, and/or herbicides (used only for reducing plant competition).

Properly applied broadcast fire can decrease hazard fuels and remove undesirable ground-level vegetation without the need for extensive manual labor. Alternatively, piling of slash via a crawler tractor is common and usually followed by pile burning. Prescribed fire and/or slash piling may not be appropriate where residual tree species are especially sensitive to fire (e.g., grand fir, western white pine, lodgepole pine, or western redcedar). Other constraints such as slope angle and residual stand structure may preclude piling of slash.

Prescribed fire and pile burning are becoming risky and expensive options, especially near populated areas. Reduced air quality from smoke, the possibility of escaped fire, and the increasing presence of urban structures are three concerns for using fire.

During the fall of 2005, a study was conducted at Priest River Experimental Forest (PREF) in northern Idaho to investigate the economics of mastication used to treat activity and standing live fuels. A rotary head masticator with 48 inches of cutting surface was mounted on an excavator/log loader to crush and chop activity fuels within harvest units. To minimize soil compaction, the 80,000-pound machine (about 8 pounds/square-inch ground pressure) traveled across an area only once and masticated a strip up to 70 feet wide. Production averaged 0.57 acres/hour (range 0.21 -0.89). Cost averaged $530 per acre (range $335-$1,395) based on a machinery cost of $300 per hour that included operator wages and a dedicated shop truck.

In addition, 11 fire-line segments totaling 2,326 feet were constructed through activity fuels using the same mastication machine. On average, 18 feet (range 16-23) of fuel break was created through mastication, combined with 4 feet (range 3-5) of fire line with 100 percent mineral soil exposure constructed down the center of the trail. Total debris, including activity fuels, ranged from 26-61 tons per acre, with production averaging 6.9 feet per minute (range 3.1-9.1).

Stand and site characteristics such as slope (which ranged from 10-50 percent), residual tree density (which was 1 to 20 trees/acre), and treatment acreage (which varied from 0.24-4.46) significantly affected the time required for accomplishment. (Reviewer comment: Several kinds of masticating machines are now available, sized from skid-steers or larger.)

Public Perceptions of West-side Forests: Improving Visual Impact Assessments and Designing Thinnings and Harvests for Scenic Integrity, authored by R.G. Ribe. 2013. Pages 22-37 in *Density Management in the 21st Century: West Side Story*. Proceedings of the Density Management Workshop, October 4-6, 2011, Corvallis, OR. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-880. Online at www.fs.fed.us/pnw/pubs/pnw-gtr880.pdf. (11.5 Mb)

(Reviewer comment: This article was targeted primarily at public land management, but the information could be useful for projects on private land with public access.)

In an ideal world, forest planners and managers would only need to make decisions to optimize the technical achievement of well defined natural-science-based objectives. Recent experience suggests that it is also

important to manage a forest's social acceptability to avoid antagonistic perceptions of forestry.

The author notes that the US Forest Service uses a visual assessment method called the Scenery Manage-ment System to address social acceptability. The method divides landscapes into sub-areas according to their (1) natural scenic beauty; (2) visibility by persons from within or afar; (3) number of likely viewers; (4) viewing activities that are especially sensitive to scenic quality; and (5) aesthetic value known by locals and recreationists. Scenic integrity levels are then conceptually defined and range from "very low" to "very high."

The author reviewed several prior studies that investigated the production of scenic beauty against measures of forest structure and types of forest treatments, including unmanaged forests. He also noted public surveys where many groups of respondents in western Oregon and Washington rated numerous matching forest photographs of pre- and post-treatment conditions.

His table summarizes all this information into a matrix for designing forests to meet scenic integrity standards from within a forest stand or from a vista. Due to limited space here, only the within-stand views information is shown in the table to the left. To attain a specified scenic integrity level (column 1) for an average forest seen by an average member of the public, at least one of three criteria (columns 2, 3, or 4) must be met.

To illustrate, a westside forest with (a) 500 stems per acre >2 inches diameter, or (b) 195 square feet per acre basal area, or (c) 30-60% of retained live trees aggregated plus low number of down wood would rate as *Moderate* Scenic Integrity Level. ■

Scenic Integrity Level	**Forest Density** (stems/ac.>2-in. dia.)	**Basal Area** (sq.ft./ac.)	**Type of Forest or Harvest**
Very High	283-405	522-740	Old-growth forest
High	283-405	218-522 ***or*** >740	• Mature forest; ***or*** • 40-100% of retained live trees dispersed, plus low number of down wood; ***or*** • 60-100% of retained live trees dispersed, plus high number of down wood; ***or*** • 60-100% of retained live trees aggregated, plus low number of down wood; ***or*** • 75-100% of retained live trees aggregated, plus high number of down wood.
Moderate	162-283 ***or*** 405-607	130-218	• 20-40% of retained live trees dispersed, plus low number of down wood; ***or*** • 35-60% of retained live trees dispersed, plus high number of down wood; ***or*** • 30-60% of retained live trees aggregated, plus low number of down wood; ***or*** • 55-75% of retained live trees aggregated, plus high number of down wood.
Low	40-162 ***or*** >607	65-130	• 2-20% of retained live trees dispersed, plus low number of down wood; ***or*** • 5-35% of retained live trees dispersed, plus high number of down wood; ***or*** • 3-30% of retained live trees aggregated, plus low number of down wood; ***or*** • 10-55% of retained live trees aggregated, plus high number of down wood.
Very Low	<40	0-65	• 0-2% of retained live trees dispersed, plus low number of down wood; ***or*** • 0-5% of retained live trees dispersed, plus high number of down wood; ***or*** • 0-3% of retained live trees aggregated, plus low number of down wood; ***or*** • 0-10% of retained live trees aggregated, plus high number of down wood.

Tips From The Treeman

Steve Bowers

DEAR TREEMAN, We have lived out near Glide (Oregon) for nine years and we have never seen the likes of all the mole hills as we're seeing now! We had a couple of mounds in our pasture a couple years ago and eradicated them with a spring-type trap. Right after our December freeze, the critters were back with a vengeance. And now I've noticed they are all over the valley, in just about every pasture, and some very nicely manicured lawns, too! They seem to be everywhere and there's no stopping them now. Does that mean we have super fertile soil with lots of yummy worms? Are they on some kind of cycle? I hope they cycle themselves outta here soon. Am I being overly concerned about this mole mania? —*Joyce*

DEAR JOYCE, Probably. There are about 30 species of moles, which are the subterranean members of the Talpidae family, and are not related to voles or shrews, a common misconception. Our furry friends have polydactyl forepaws (an extra thumb) next to the regular thumb, unique to moles. The supernumerary digit assists these critters in excavating tunnels upwards of 18 feet/hour.

And yes, moles have something in common with trees: they both prefer moist, well-drained soils. It is quite possible you're seeing an abundance of them after the December deep freeze due to the location of the mole's nourriture de preference (worms) and their affinity for soils rich in organic material and nitrogen, normally found in the upper regions of the soil profile (which had been frozen). The moles likely built up a hearty appetite grubbing around in a barren environment. Once the thaw occurred, you are witnessing their migration back to more fruitful hunting grounds.

Are you wondering how those destructive denizens of the dark breath down there? Moles have a unique hemoglobin that allows for a tolerance of high levels of carbon dioxide. When you see their "hills" being erected, this is merely a path of least resistance in displacing unwanted soil, not their "coming up for air." And while we're eradicating some of these mole myths, let us shed some light on another one: they can see the light, albeit their sight is extremely limited. And many tend to associate a mole's activity with the nocturnal hours, they being more matutinal by trade.

By nature, moles are anti-social types, so one might be surprised by the vast number of hills in a given area. This can be credited largely to a fertile site and an unusual convergence of a number of individuals. Some will call you lucky: you've got free earthy excavators aerating your soil. The likely ones calling you lucky resemble politicians: they foist the value of something with no experience and not having to live under the ramifications thereof. Good news on moles is their lifespan is three to four years, so just wait 'em out. Bad news is no term limits.

Eradication. The ubiquitous Victor™ scissor-style trap has proven successful with proper installation. Victor also makes a plunger-style trap (harpoon-like)...call me Ishmael. And while a white mole is a rarity, it is a possibility. Human hair? Begs the question: do barbers have moles? Human urine? I suppose you could multi-task and irrigate the yard, but the efficacy in mole eradication remains in doubt. Broken glass, razor blades, thorny plants? The concept of placing "nuisance" objects in a tunnel to discourage its use merely encourages additional tunnels. Mothballs? The active ingredient in mothballs is naphthalene: you're trying to stink 'em out. The stinker-strategy also includes pickle juice, rotten eggs, or fish…not very effective, but a great way to clean out the refrigerator.

Vibration or ultrasonic devices: playing a radio with the speakers pointed to the ground. A mole's hearing capacity is limited, but it does have an acute sense of vibrations, so be sure you have a "boom box" when you crank up the volume and check with the neighbors on their musical preferences. Car exhaust? The experts say no, but some say we're gaining. If a mole's activity is limited, i.e., no extensive tunneling, flares have been known to eradicate moles. Striking a flare ignites hydrocarbons, and in combination with the atmosphere, creates carbon dioxide. Great idea, but the global warming crowd will object.

A similar concept is flooding them out with a hose. Again, the deciding factor is having limited tunneling, thus allowing sufficient water to drown the victim. We have personally witnessed the successful implementation of such a strategy. And if patience is one's virtue, grab a rocking chair and the shotgun and wait 'em out. Be sure to use a shotgun due to the large volume of gun powder. When Mr. Mole pushes the soil upwards, you fire back with sufficient force to bring a rapid and mortiferous moment to his subterranean exploits.

If organic is your thing, the mole plant or gopher plant *Euphorbia lathyris* is ascribed as being a mole deterrent. Purportedly, they do not like the scent exuded by the roots into the soil, or the taste it gives to worms. The Mexican marigold, *Tagetes minuta*, is also used to repel pests. Others swear by the castor-oil plant, *Ricinus communis*. "Organic" might sell, but the moles aren't buying.

There are several products utilizing poison. Most come in the form of worms, which are conveniently placed in the tunnels and easy pickins' for the moles, although a potential danger to other animals. This one has potential. Finally, some say just tamp down the hills and eventually you'll wear 'em down and they'll leave on their own accord. Might get you fallen arches. —*Treeman*

Oregon Chapter Finds Innovative Way to Fund Scholarships

By BOB MAHAFFY

For the past five years, the OSWA Coos-Curry Chapter has been awarding a $1,000 scholarship to a graduating senior from one of the nine high schools located in Coos and Curry counties.

Preference is given to a student from a timber or agricultural-dependent family. There are no restrictions on the area of study the recipient wishes to pursue. Past recipients are on career paths as varied as music, education, medicine, and engineering.

A couple of years ago, the chapter board decided we needed to come up with a more stable funding mechanism for the scholarships. We settled on selling myrtle firewood logs to a local mill, Slice Recovery, that specializes in processing and selling kiln-dried firewood.

This is a product that ordinarily would be left in the woods or on the landing because of its low value. However, Dick Shellhamer of Riverside Logging has been very supportive of the scholarship fund and offered to log and load the material free of charge. This made it feasible to fund the scholarship without depleting our treasury. ■

PHOTO COURTESY OF BOB MAHAFFY

The OSWA Coos-Curry County Chapter sells myrtle firewood logs to a local mill to fund local scholarships.

BOB MAHAFFY *is a member of the Oregon Small Woodlands Association, Coos-Curry Chapter. He can be reached at 541-267-7193 or farmboy1@wildblue.net.*

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