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The Woodland Workbook

Management Planning

Financial Considerations in Deciding When to Harvest Timber

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Increasing population and worldwide demand for wood products, combined with diminishing availability of timber from public lands, have made log prices increase dramatically. Many owners of 30- to 40-year-old timber stands are tempted to harvest at that age in response to record high prices.

The threat that increasing regulations may limit future options also can influence a decision to harvest now rather than wait. When other factors are considered, however, delaying harvest often makes more sense.

If it's assumed that larger logs with more knot-free wood yield more valuable products, then stands will increase in value as they grow older. Therefore, greater overall financial return from higher value logs can be realized when the timber harvest is delayed.

Values such as wildlife habitat, water quality, and riparian protection also may be enhanced. Esthetics also are an important consideration. These nontimber values should be an integral part of woodland owner objectives. They also are compatible with timing harvest decisions to maximize financial return.

This publication focuses on even-aged, fully stocked, Douglas-fir stands. Because of fire history and past harvesting patterns, such stands dominate west of the Cascades throughout much of Oregon, Washington, and northern California. Stand volumes and dollar values will be different for other species.

Alternative harvest strategies

Woodland owners harvest their timber for many reasons, and it's important to develop a harvest strategy that will meet your goals and needs.

If maximizing value during your lifetime and passing the timber asset on to heirs is your goal, then your harvest strategy must take into account not only current income but effects on inheritance taxes as well. At today's high values, even a modest area of 75 to 100 acres of mature timber can represent a greater inheritance tax obligation than may be incurred by developing an alternative management and harvest strategy during your lifetime.

A plan to develop a distribution of several age classes by harvesting in increments at different ages is one strategy. Used in combination with commercial thinning as the remaining acreage grows older, this strategy will provide a flow of intermediate income. The property will remain a productive forest stand an attractive investment for the heirs, while the inheritance tax is reduced.

If recurrent income through time is the goal, small patch clearcuts or commercial thinning can be used. In this way, value can be recovered from smaller trees before they are crowded out and die.

At the same time, selective removal of lower quality trees improves the stand. Larger remaining trees develop higher quality wood and higher values as they grow older. From an economic viewpoint, this justifies delaying a clearcutting harvest. Better habitat for some species of wildlife can be an added benefit.

Many people harvest their timber in response to a need for cash. At age 30 to 40, however, clearcutting may not be the least expensive source of money. The timber may be increasing in value at a rate exceeding that which banks are charging to lend money. Therefore, you may be better off to let your timber grow and seek a loan at interest rates below what your timber capital is earning. Despite the risk of holding timber, this can be a sound financial decision.

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Timber value increases with age

In current markets, most species, and particularly Douglas-fir, increase in value dramatically when 30- to 40-year-old timber is allowed to grow older. This happens for several reasons.

1. At age 30 to 40, a well stocked Douglas-fir stand **has just entered its period of greatest annual volume growth**. The risk of animal damage and brush competition is past. Most of the site's productive resources are now concentrated in growing wood. Typical stands will continue to sustain this high growth rate for another 30 to 40 years.

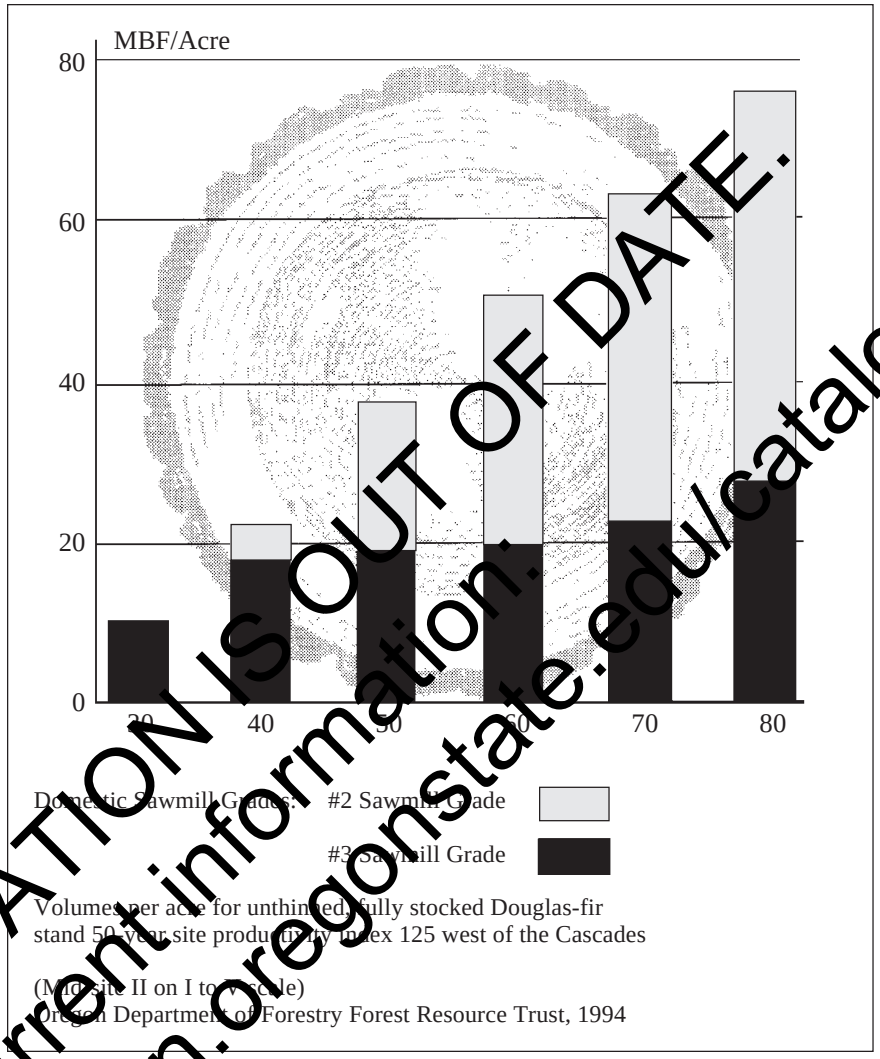
2. As forest stands grow older and the trees get larger, they become more crowded. Shade causes the lower branches to die. These dead branches break off, and the tree grows new wood and heals over the branch stubs.

This process is called "self pruning" and is the reason that the trunks of older trees are smoother. It's also why older trees contain more high-value, clear, knot-free wood.

3. Log grades are based on a combination of minimum log diameter, surface characteristics, and anticipated recovery of lumber. For example, #3 sawmill grade logs must be a minimum of **6 inches** in diameter on the small end and at least 12 feet long. Knots can be up to 3 inches in diameter, but the log must yield at least 50 board feet of "standard and better" lumber. (A board foot is 12 x 12 inches x 1 inch thick.)

In contrast, #2 sawmill grade logs must be a minimum of **12 inches** diameter on the small end, and a minimum of 12 feet long. They can have knots up to only $2^1/_2$ inches in diameter and must yield at least 60 board feet of "construction and better" lumber.

Thus, #2 grade logs are higher quality and more valuable than #3 grade logs. Trees generally will change into the more valuable log grades as they grow older and self prune. Foresters may call this process "grade shift." Figure 1 illustrates how grade shift occurs as stands grow older.



Volumes per acre for unthinned, fully stocked Douglas-fir stand 50 year site productivity index 125 west of the Cascades

(Mid-site II on I to V scale)
Oregon Department of Forestry Forest Resource Trust, 1994

Figure 1.— *Typical log grade shift.*

4. A natural thinning process occurs as timber stands mature. Some trees die, and growth is concentrated on the taller trees that capture most of the sunlight and growing space. Smaller trees fall farther behind and eventually are crowded out and die. Harvesting smaller trees that are being crowded out before they die can recover value and generate a frequent source of income.

5. As stands mature and trees become larger, there is an added bonus. There is more volume in sawlogs and less in low-value pulp logs. Fewer pieces need to be handled when logs are larger. The result is a savings in logging costs per unit of volume and greater overall dollar return for the landowner.

Economic advantages of delaying harvest

Because a well stocked 40-year-old Douglas-fir stand has just entered its period of most rapid growth, harvesting too early means that volume production will be sacrificed. State-of-the-art computer growth simulators such as DFSIM and ORGANON show that on productive forest land, harvest at age 40 yields only 50 to 60 percent of potential total volume.

The loss of potential growth due to early harvest is even more dramatic on poorer quality sites, where only 30 percent of potential growth is realized when stands are harvested at age 40.

Annual growth actually reaches its peak when stands are 70 to 100 years old. Stands that have been aggressively thinned to redistribute growth to the remaining larger trees actually may peak at an even older age. Therefore, if volume produced from an 80-year rotation is compared with that produced by two 40-year rotations, the longer rotation will produce 25 percent more total volume.

The 80-year-old stand also has larger trees, averaging 28 inches in diameter, with higher quality logs. In the future, there may be an even greater price premium for large, good quality logs because of reduction of old growth harvest from public lands. This assumes that society will continue to place a higher value on products from clear, knot-free wood, rather than those produced from fiber.

After considering the grade shift shown in Figure 1, the value advantage of one 80-year rotation over two 40-year rotations becomes even more pronounced. This difference is great enough that even when the financial cost of delaying revenues is discounted to present value, holding timber still often makes sense.

The return from increased timber value during this period of rapid growth and grade increase often can exceed loan interest rates. The increase in physical asset value realized by holding timber for the 10-year period from age 30 to 40 can approach 12 percent compound interest without taking inflation into account (see Table 1).

This can be even more attractive when you consider that during this period it's often possible to generate some intermediate income from commercial thinning. Thinning can be used to improve the stand and provide cash, leaving the residual timber asset to grow in value. Rate of return gradually declines as growth slows with age.

Even assuming a 4 percent inflation rate, timber at age 70 still is earning a nominal 7 percent rate of value growth. Thus, when lending rates are below 7 percent, it may be a sound financial decision to delay harvesting and extend the rotation even further.

Included here is the cyclical nature of timber prices. Over the past several decades, however, timber prices have increased conservatively at approximately 1 percent *above* inflation due to growth in population and demand for wood products.

Risks of delaying harvest

Of course, there are risks associated with holding timber. Fire, wind, insects, and disease always are threats to timber stands. Changes in regulations may limit future harvest. Spotted owl, marbled murrelet, and salmon recovery plans under the Endangered Species Act make almost daily news.

Such risks are an important consideration when making harvest decisions. Whether or not they are the driving factor for cutting early becomes an individual judgment.

However, before making a harvest decision, you should spend a little time using the figures in this publication to analyze how your timber volume and value growth compares with your best alternative source of money. If you need assistance in this process, consulting foresters are good sources of help. Your banker or financial advisor also can assist you.

Doing your own economic analysis

If you decide to do your own economic analysis, you will need the following tools:

- Recent timber cruise showing volumes and grades. See *Stand Volume and Growth: Getting the Numbers*, EC 1190.
- NRCS Soil Survey site productivity map for your property. Available at your local U.S. Natural Resources Conservation Service office.
- Growth and yield tables. Can be found in the *Forester's Field Handbook*, available from U.S. Forest Service, State and Private Forestry, Pacific Northwest Region, P.O. Box 3623, Portland, OR 97208.
- Compound interest table
- Calculator or net present value computer program. See *Forestry Financial Analysis I*, EC 1146, and *Forestry Financial Analysis II*, EC 1147.

At today's high timber values, the decision of when to harvest is important. Thorough evaluation may lead to the conclusion that, compared to other forms of investment, holding timber for the right time and market can be a good decision.

Table 1.—*Approximate equivalent annual compound interest earned by holding timber.**

Ten-year Growth Period	Approximate Interest Rate without Inflation Due to Volume Growth	Approximate Interest Rate without Inflation Due to Grade Shift	Combined Approximate Annual Compound Interest without Inflation	Combined Rate Assuming 4% Inflation
Age 30 to 40	7%	5%	12%	16%
Age 40 to 50	5%	2%	7%	11%
Age 50 to 60	3%	1%	4%	8%
Age 60 to 70	2%	1%	3%	7%
Age 70 to 80	1%	1%	2%	6%

**Approximate values intended to reflect fully stocked, western Oregon and Washington Douglas-fir mid-site II. Values will vary by site and stand condition.*

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The Woodland Workbook is a collection of publications prepared by the Oregon State University Extension Service specifically for owners and managers of private, nonindustrial woodlands. The Workbook is organized into separate sections, containing information of long-range and day-to-day value for anyone interested in wise management, conservation, and use of woodland properties. It's available in a 3-ring binder with tabbed dividers for each section.

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