



YOU AND YOUR FOREST: LETTER 6

Sawtimber Management

Preface: The following article was written by Gary Goff and Peter Smallidge, Department of Natural Resources, Cornell University, Ithaca, NY

Managing your woodlot for sawtimber is the principle focus of this article and provides a basic understanding of financial considerations involved with sawtimber management.

Tree Value: A Basis for Woodland Management

Although relatively few forest owners state that financial gain from sawtimber sales is the primary reason for owning forestland, virtually ALL private forests are harvested for sawtimber sooner or later! Therefore, it is generally financially advantageous for forest owners to manage their stands for the potential of an eventual sale. Typically, sawtimber management activities are quite compatible, even complementary to other ownership objectives such as wildlife. Appropriate, timely silvicultural practices often will double the eventual sales revenue while simultaneously improving wildlife habitat, enhancing biodiversity and promoting sustainable production.



The final goal of timber management is the harvest and sale of trees suitable for lumber or veneer. Harvesting and selling timber is the pay-off for years of timber management or, at the very least, the culmination of decades of forest growth. It is important to plan and proceed carefully. It may be many years before a forest recovers from improper harvesting practices.

Just as a brief exercise to help you gain some insight to relative value of different sawtimber species, take a moment to fill in the blanks on the following table. Let's assume each tree is part of a medium-sized sale and contains two 16-ft. logs. Price is for stumpage (the price a logger would pay for the tree as it stands on the stump in the woods).

(Answers are at the bottom of the article following the references.)

What's that tree worth?

20-inch D.B.H.* white pine. \$_____ sawtimber \$_____ firewood

20-inch D.B.H.* black cherry \$_____ sawtimber \$_____ firewood

20-inch D.B.H.* red maple \$_____ sawtimber \$_____ firewood

**D.B.H. -diameter at breast height (4.5 feet from the ground)*

As you will see from the answers at the end of the issue, stumpage value varies greatly by species. Several other variables greatly influence sawtimber values also such as; quality of logs, size and volume of the sale, efficiency of the harvest, distance to mills, size of trees, limitations on conditions of the sale, etc. The NYS Dept. of Environmental Conservation publishes the "New York Stumpage Price Report" semi-annually. This report lists the most common and range of stumpage prices for several species by region throughout NYS. See the address following the references at the end of this article to be put on their mailing list.

When to Harvest

As soon as a tree has enough wood fiber to meet the costs of felling, limbing, bucking (the process of cutting a felled and delimbed tree into logs), skidding, (to haul, roll, or drag logs along a trail), loading, transporting, and processing, it has a positive dollar value to the forest owner and is merchantable. However, just because you can harvest the tree, doesn't mean you should harvest the tree. It is usually financially unwise to harvest trees as soon as they reach the minimum merchantable size, however, because they are not yet at their optimum value. Loggers will "come calling" as soon as they see trees that will meet their expenses and provide an adequate profit margin for their work. Profits for forest owners increase greatly as the trees continue to grow from 12 to at least 18 inches D.B.H. (Table 1 illustrates a number of important timber management considerations):

At 12 to 14 inches DBH, hardwoods have a low value, but the rate at which they are increasing in value is high, especially for fast-growing trees with proper growing space. This is a good size to think about thinning (removing) the low quality trees to concentrate growth on these higher quality trees, whether for mast production or sawtimber.

As a sugar maple tree increases in diameter from 14 to 24 inches, it may increase 33 percent in merchantable height, increase 4 times in volume (110 to 458 Board foot), and increase more than 10-fold in dollar value (\$44 to \$458). If the tree is veneer quality its value would be substantially more.

At 14 to 18 inches DBH, hardwoods may nearly double in value for each 2 inches of growth in diameter as log grade improves with size and as height growth continues. At a growth rate of 2 inches in diameter every 10 years (10 growth rings/inch), a tree will double in value in 10 years (a compound growth rate of 7 percent, not including inflation). Tree value increases as trees grow because (1) they attain a larger volume, (2) they often shift into the next



better log grade and are worth more per board foot, and (3) the price of sawtimber has typically increased with inflation.

At 20 to 24 inches DBH, hardwoods increase substantially on a dollar basis, but because the grade has peaked, the rate at which their value is increasing may slow to a compound growth rate of 3 percent or less. The increase in dollar value is mostly the result of the increase in volume. Growth rate is also slowing, and the risk of natural disturbances is greater.

At 24 to 28 inches DBH, the dollar value continues to increase, but change in grade and height are unlikely. Also, growth in diameter is typically slower as the tree reaches biological maturity. These two factors could reduce the compound growth rate to 2 percent or less.

The diameter thresholds given above might tempt you to harvest based only on tree diameter. Tree harvesting is a tool to provide revenue to the land owner, but also provides the opportunity to regenerate the forest to produce the next high quality crop of trees.

Table 1 on the following page illustrates the potential value of high-quality 14 to 20-inch crop trees. These trees are merchantable but definitely not "financially" mature. They are the true money makers in a woodland and, therefore should not be harvested during this prime growth period unless they are crowded. Not all trees in a stand will show this kind of value growth. The majority of trees should, over time, be removed from the favored crop trees. Firewood is a good market for such trees. Note that because firewood trees do not improve in grade, their value is tied directly to volume growth only. Consequently, their annual compound value growth rate is only about 1.5%.

Table 1. Stumpage Value of Sugar Maple Trees based on Size and Grade

DBH ^a (inches)	No. of 16-foot logs	Volume ^b (bd.ft.)	Grade ^c	Dollar value MBF ^d	Age of tree	Dollar Firewood	Value/tree Sawtimber	Annual Compound growth rate ^e
12	1.0	58	2 to 3	300	50	2	17	8.5% (1/10" growth ring)
14	1.5	110	2 to 3	400	60	3	44	" "
16	1.5	146	2	500	70	5	73	" "
18	2.0	240	1 to 2	850	80	7	204	3% (1/10" growth ring)
20	2.0	305	1 to 2	850	90	9	259	" "
24	2.0	458	1	1,000	110	13	458	1.5% (1/12" growth ring)
28	2.0	635	1	1,000	134	17	635	" "

^aDiameter at breast height or 4 1/2 feet above ground.

^bInternational 1/4-inch rule.

^cGrade classification of butt log: 1= highest value. These are typical grade changes with size.

^dBased on the quality of expected yield of one-inch lumber, 1998 NYS stumpage value.

^eDoes not include inflation, but quality sawtimber value generally matches or exceeds the inflation rate.

The timber value of individual trees regardless of species, logging costs and current market trends, is largely a function of the total amount of wood fiber they contain and the quality of their lumber or veneer. Log grade is determined by size (diameter and length), form and the presence or absence of defects such as knots, ingrown bark, and worm holes. In general, as a tree increases in size, its logs increase in grade; as grade and size increase, so does value. Diseased trees in contrast may lose value and grade faster than they grow in volume. A Timber harvest should therefore, occur when the rate of tree growth and value have peaked.

Hardwoods such as sugar maple, on good sites, reach financial maturity (the age at which a tree is no longer increasing in value at a profitable rate) at about 20 to 24 inches. Whereas, on poor sites it may be reached at 16 to 20 inches. As indicated in Table 2, the age at which trees reach financial maturity varies significantly depending on species, site quality, damage from insect and disease attacks, and management history. Typically, active management will shorten the time to financial maturity.

Table 2. Average age at which timber species reach financial maturity (24 inches DBH*) in managed stands on good sites.**

65-75 years	75-95 years	95-124 years	125 years or more
White pine	Black oak	Hemlock	White oak
Tulip poplar	Black cherry	Sugar maple	Chestnut oak
Red oak	White ash	Red maple	
Red pine	Basswood	Yellow birch	
		Hickory	
		Beech	

*DBH = diameter at breast height or 4 1/2 feet above ground.

**Growth rate may be one-third less in unmanaged stands.



The Influence of Trends and Inflation

No discussion about sawtimber stumpage values is complete without considering trends and inflation. Price trends of three common sawtimber species over the decade from 1988 to 1998 in the Western Finger of NYS exemplify typical changes in tree value and inflation. Figures from the NYS DEC stumpage price report mentioned above provided the basis for the following analysis. (Prices and trends vary across NYS, so it behooves forest owners to become familiar with their region!).

Sugar maple was the big winner over that time period, increasing in gross stumpage value by about 500% (a region-wide phenomenon). Red oak value increased by about 33%. White ash increased by 20%. When adjusted for inflation however, by subtracting the Consumer Price Index increase of about 38% over that time period, you can see that only sugar maple increased substantially. Red oak was essentially static and white ash lost about 18%. The bottom line is, however, stumpage value of quality

hardwoods generally keeps pace with inflation, as wood is a commodity item that is strongly tied to the general economy. Therefore, the annual compound value growth rates given in Table 1 are not greatly influenced by inflation. Note there are fluctuations over the years, but a low point is typically followed by increases. Don't be pressured into a snap decision to sell timber.

The authors of this paper believe that demand for quality northern hardwoods (desirable species of the high quality form) will continue to outpace supply, which should bolster stumpage prices into the foreseeable future. Species values are influenced by "consumer fads" and therefore fluctuate. Consequently, it is prudent to build some flexibility into harvest schedules to take advantage of markets. If prices appear down, waiting 3 to 5 years may be a good idea. Remember, trees store very well on the stump, in fact they continue to grow!

Website References:

www.dnr.cornell.edu/ext/forestrypage/index.html Cornell Cooperative Extension
www.agroforestrycenter.org Cornell Cooperative Extension of Greene County's
Agroforestry Resource Center
www.unl.edu/nac (USDA National Agroforestry Center)
www.nal.usda.gov/afsic (Alternative Farming Information Center)
www.dec.state.ny.us/website/dlf (NYS DEC Division of Lands & Forests)
www.nrcs.usda.gov/technical (Natural Resources Conservation Service)
www.plants.usda.gov (USDA Plants Database)
<http://maple.dnr.cornell.edu> (Cornell Maple Program)
www.Plant-Materials.nrcs.usda.gov (NRCS Plant Materials Program)
www.argorday.org (Arbor Day Foundation)
www.nrcs.usda.gov/feature/backyard (NRCS Backyard Conservation)
www.fs.fed.us/ (US Forest Service)

References

Timber Management for Small Woodlands—IB 180, by Gary Goff, James Lassoie, and Katherine Layer. 1984 (rev. 1995). Available for \$5.50 (include tax and \$1.00 shipping) from: Cornell University, Resource Center-MW, 7 Business & Technical Park, Ithaca, NY 14850.

Stumpage Price Trends (1973 to 1996) for Reporting Area L: Clinton, Essex, and Franklin Counties, by Jeffery Prime. 1998.NY Forest Owner, Vol. 36, no. 2, pgs. 14-15.

Financial Maturity: A Guide to When Trees Should be Harvested-FNR 91, by W.L. Mills and John C. Callahan. 1981.Purdue University, Cooperative Extension Service, 1140 Agriculture Administration Bldg., West Lafayette, IN 47907

Special Report. ECONOMICS. The American Tree Farmer. Vol. 3, no. 1. 1984. (entire issue devoted to financial considerations of sawtimber management). American Forest Foundation, Suite 780, 1111 19th St., NW, Washington, DC 20036

Hardwood Lumber and Stumpage Prices in Two Eastern Hardwood Markets: The Real Story—NE-RP-601, by Neal Kingsley and Paul DeBald. 1987.USDA Forest Service, Northeastern For. Exp. Stn., 100 Matsonford Rd., 5 Radnor Corp. Ctr., Suite 200, Radnor, PA 19087-4585.

To receive a copy of the stumpage price report contact: NYS DEC, Division of Lands & Forests, Forest Products U&M Section, 625 Broadway, Albany, NY 12233

Answer to page 1 question: A 20" diameter tree, with 2, 16 ft. logs contains 580 board feet of lumber (International 1/4" log rule). Current stumpage prices per 1000 board feet (MBF) are about \$120, \$550, and \$125 for pine, cherry, and red maple respectively. There is no market for conifer firewood, and hardwoods are worth about \$13/cord.



Some Final Thoughts...

As a recipient of *You and Your Forest Series* you already have an interest in your property and a desire to learn about what can be done to improve your property whether for income or personal enjoyment. As a forest landowner you have probably come to the realization that your woodland changes annually. This tree that you admired has been hit by lightning, that tree is being attacked by something, those trees are doing well despite road salt impacts, etc. For those in the Catskill region of eastern New York, the impact of the forest tent caterpillar infestation of past summers and other defoliators are prime examples of how priorities may change for woodlot management. Seriously damaged trees may need to be salvaged and in some areas sugar maple production was curtailed as a viable short term goal. Infestations of invasive forest insects, such as the Emerald ash borer and the Asian long horned beetle, may also necessitate investigating salvaging practices. Forest management can be a long term as well as a short term endeavor. A landowners objectives may change with time and any good planning effort needs to be able to adjust to changing circumstances.

From a personal perspective Gary Goff, from Cornell University and a woodlot owner for over twenty five years, shares his insight in the following message.

“I have probably experienced all or most of the shortcomings of one who should have known better. Fortunately, my woodlot has recognized many of my faults and has taught me, by example, where I have gone wrong. In the interest of education, I would bullet those indiscretions as a matter of course as follows”:

- ◆ Don't hire your logger cousin to cut your woodlot
- ◆ Excessive cutting can alter wind patterns and could destroy the trees you are trying to save or release
- ◆ Avoid cutting everything that appears to be dead for firewood
- ◆ Insist on having supervision of your harvesting operation no matter how small
- ◆ Seek professional advice even if it hurts—financially as well as personally
- ◆ Act short term and think long term
- ◆ If you hate hemlocks-don't hate them all
- ◆ One mans' cherry veneer is another's firewood
- ◆ Being self-sufficient always takes longer
- ◆ Wolf trees are good for something-sometimes
- ◆ The best wood to burn is not necessarily at your doorsteps
- ◆ Utilities have the right-of-way
- ◆ One trees' disease is another's fertilizer
- ◆ If you're felling trees-think the worst case scenario first
- ◆ If you don't have it in writing-chances are you don't have it!

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