VERMONT FORESTRY LETTER SERIES

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Timber Management

Understanding the value of your forest timber products is the principle focus of this article and provides a basic understanding of financial considerations involved with timber management.

Although relatively few forest owners state that financial gain from timber sales is the primary reason for owning forestland, virtually ALL private forest owners conduct some form of a timber harvest sooner or later! Appropriate, timely silvicultural practices often will double the eventual sales revenue while simultaneously improving wildlife habitat, enhancing biodiversity and promoting sustainable production. 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 critical that all harvesting be conducted under the direction of a forest management plan. A well written plan will address what is best for the forest as a whole while incorporating economical and landowner objects. As most of you know or are figuring out this process is very long term and spread over generations. What is important is to plan and proceed carefully. It will be years before a forest recovers from improper harvesting practices.

Tree Value: A Basis for Woodland Management

What is the value of a tree? As stated earlier this letter will be focusing on the economical value of trees. One must not forget that trees also have an ecological value too. Unfortunately at this time we are unable to qualify this value in economical terms that would provide a return to a landowner. With the renewed interest in our changing climate and increasing concentrations of green house gases our forest resources are being scrutinized more closely. For example large forest landowners are experimenting with selling Carbon credits based on the accumulation of carbon storage in their forest trees. Business that emits CO_2 may be required to balance their emissions through mechanism of Carbon sequestration. How this will all play out in the market place is still unknown.

Before we look more closely at the value of a tree it is important to understand some general terms. Obviously there are steps and costs involved in getting the tree from stump to mill. The value of the tree still standing in the woods before it is cut, skidded, loaded and trucked to the mill is called "stumpage value". This is the value of the tree to the landowner (a fraction of mill values you may see) and is sold in board foot units, cord or by a weight measurement. The tree value is based on three general products; veneer, sawlog or pulpwood(firewood). The veneer is the highest value, sawlogs next and the lowest is pulpwood/firewood. The veneer and sawlog products are then divided into "grades" and priced accordingly. Veneer logs are sliced or peeled making hundreds of sheets of very thin wood. Sawlogs are sawn into boards and squares and pulpwood is used for paper production or biomass.

Just as a brief exercise to help you gain some insight into the 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 of the tree as it stands on the stump in the woods).

(*Answers are at the end of this section.)*

What's that tree worth?

20-inch D.B.H.* white pine. $____ sawtimber $____ pulpwood/firewood

20-inch D.B.H.* red oak $____ sawtimber $____ pulpwood/firewood

20-inch D.B.H.* sugar maple $____ sawtimber $____ pulpwood/firewood

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

Your fifth quiz: ↓☺

Dendrology Challenge #5: Dendrology is the botanical study of trees. Each forestry letter will highlight an important Vermont tree by displaying its leaves, seeds, nuts or silhouette within the issue. Can you guess what tree it is? Why is it important? What benefits does it provide to people, wildlife or the environment? See the clues throughout this letter and the answer on page 8 (no peeking!).

As you will see from the answers at the end of the issue, stumpage value varies greatly by species. Several other variables greatly influence stumpage 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.

Answers: A 20" diameter tree, with 2, 16 ft. logs contains 300 board feet of lumber (International 1/4" log rule). Based on 2010 stumpage prices per 1000 board feet (MBF) are about $36, $130, and $105 for pine, red oak, and sugar maple respectively. The white pine pulpwood market is in New Hampshire, New York and Maine and typically low in value. Stumpage is usually $1/cord or left on the ground in the woods to rot back into the soil. The hardwood species can be sold as pulpwood or firewood and are worth $5 to $15/cord.

When is a tree financially mature?

As soon as a tree has enough wood fiber to meet the costs of felling, limbing, bucking, skidding, 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 may call 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 good soils and proper growing space. This is a good size to think about thinning (removing) the low quality trees to concentrate growth on the higher quality trees, whether for mast (fruit/nut) 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 feet), and increase more than 10-fold in dollar value ($55 to $687). 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 may have 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 (ice and wind, disease and insect damage) is increasing.

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 but every forest is different and there are always a number of other factors that need to be considered when choosing to harvest trees from your woodlot. Cutting based on diameter alone can be very destructive to the forest integrity as a whole and always should be avoided. This type of cutting will briefly maximize the short term rate of return at the expense of future

Dendrology clue #1: Perhaps the worst place to be in a storm is under this kind of tree which is blitzed by lightning more than any other tree. (Some scholars theorize that is what led the ancient Greeks to consecrate this tree to Zeus, a notorious hurler of lightning bolts.)

productivity. If you cut only the largest, best growing, most valuable trees and leave the slower growing poorer quality trees that will be the next forest and future seed source. Similar analogy is the horse breeder who shoots the winning horse and uses the losers for breeding. The forest will decline rapidly. It is always advisable to seek the assistance of a professional forester before cutting trees in your woodlot. Remember, tree harvesting is a tool to better manage forest growth within your woods and can provide revenue to the land owner, but it also provides the opportunity to regenerate the forest to produce the next high quality crop of trees.

Table 1 - Illustrates the potential value of high-quality 12 to 20-inch sugar maple crop trees. These trees are merchantable but definitely not "financially" mature. They can be the true money makers in a woodlot and therefore should not be harvested during this prime growth period unless they are crowded, defective or meet other defendable management criterion. Not all trees in a stand will show this kind of value growth. The majority of trees should, over time, be removed from around the favored crop trees. Firewood can be 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 Miff	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	105	2 to 3	350	60	3	$39	" "
16	1.5	143	2	525	70	5	$75	" "
18	2.0	240	1 to 2	775	80	7	$186	3% (1/10" growth ring)
20	2.0	300	1 to 2	775	90	9	$232	" "
24	2.0	440	V	2,000 Could be up to $4,000/MBF	110	13	$880	1.5% (1/12" growth ring)
28	2.0	615	V	2,000 Could be up to $4000/MBF	130	17	$1,230	" "

[a]Diameter at breast height (DBH) or 4 1/2 feet above ground.
[b]International 1/4-inch rule.
[c]Grade classification of butt log: V, 1, 2, 3 = highest value to lowest value. These are typical grade changes with size.
[d]Based on the quality of expected yield of one-inch lumber, 2010 Vermont average stumpage value.
[e]Does not include inflation, but quality sawtimber value generally matches or exceeds the inflation rate.

Dendrology clue #2: The most cold-loving kind of this species, it can be found as far north as Nova Scotia and was used by colonial woodworkers for general construction, sugar and molasses barrels and even plank roads – before the gravel road technique was discovered.

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 (sweep, crook, taper) 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, and as grade and size increase, so does value. Diseased trees, in contrast, may lose value and grade faster than they grow in volume. A well designed timber harvest should therefore occur when the rate of tree growth and value have peaked on the "average" tree in the stand.

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 it takes for a tree to reach financial maturity.

Table 2. Average age at which timber species reach financial maturity (24 inches DBH = diameter at breast height or 4 1/2 feet above ground) in managed stands on good sites. Growth rate may be one-third less in unmanaged stands.

65-75 years	75-95 years	95-124 years	125 years or more
White birch	White pine	Hemlock	White oak
Balsam fir	Black cherry	Sugar maple	
Basswood	White ash	Beech	
Red pine	Red oak	Yellow birch	
Red maple	Red spruce		

Periodicals -

We encourage you to take full advantage of these periodicals in your forest management journey:

Northern Woodlands: $21.50/year (or included as part of VT Woodlands Assn membership!), Quarterly magazine. (800) 290-5232; perhaps the best woodlands periodical ever to be published. Also good book reviews and recommendations. www.northernwoodlands.org

Northern Logger and Timber Processor : $18/year, Monthly magazine. 1-800-318-7561, npetrie@northernlogger.com ; good advice & information on marketing, trends, logging, equipment, politics, laws, regulations, etc; excellent editorials. www.northernlogger.com

Dendrology clue #3: This deciduous tree's winter twigs are easy to identify as they have multiple terminal buds. It also has corrugated bark with wide flat topped ridges separated by shallow fissures.

Dendrology clue #4: The fruit – a true nut, is eaten by bears, deer, raccoons, mice, wild turkeys, pheasants, quails, crows, blue jays, squirrels and in colonial times – pigs.

These prices are for #1 hardwood logs, at least 8 feet long, with three clear faces and a minimum 12-inch top diameter. In the timber world, this is a log of average quality, not a prime sawlog and not a poor one.

Landowners should remember that the dollar amount here indicates what is being paid for logs that have been felled, limbed, skidded, bucked, and delivered to a mill or buyer. The cost of logging and trucking need to be subtracted from these figures to arrive at the price paid to the landowner. Because every job is different, these costs vary widely.

Negotiating a fair price requires an understanding of markets and job conditions. It's recommended that landowners without this knowledge use a forester as an agent. A forester's fee will add to the cost, but their representation will often result in a higher payment for the timber.

These data are compiled from interviews with suppliers and buyers and from the most recent print and online versions of the *Sawlog Bulletin*, and are used by permission. For more information on the *Sawlog Bulletin*, call (603) 444-2549 or go to sawlogbulletin.org. Please note that many of these prices were reported three months prior to our publication date, and current prices could be higher or lower.

DOLLARS PER THOUSAND BOARD FEET	NY	VT	NH	ME
White Ash	307	335	317	350
White Birch	240	212	250	283
Yellow Birch	393	456	483	518
Black Cherry	517	450	488	N/A
Sugar Maple	236	256	267	243
Red Maple	236	256	267	243
Red Oak	410	450	433	438

Prices compiled February 1, 2011

As log prices slowly rebound in the expanding economy, differences are emerging between the four states. The accompanying table shows the change in price being paid for each species, compared with Autumn 2009 (the overall bottom of the market). Vermont's prices are up an average of 17%, mostly on the strength of a 39% increase in oak values, with only red maple yet to regain its 2009 price (a phenomenon true in all four states). Maine is in the number two spot with an 11% overall increase, thanks to having just the one red maple loser. New Hampshire is third with a 10% increase, dragged down by the poor performance of both maple species, and New York is fourth with an 8% increase, the runup in oak being offset by double-digit declines in red maple and white birch.

	NEW YORK	VERMONT	NEW HAMPSHIRE	MAINE
White Ash	22%	26%	20%	21%
White Birch	(13%)	24%	24%	10%
Yellow Birch	24%	15%	23%	16%
Black Cherry	10%	6%	16%	N/A
Sugar Maple	5%	10%	(2%)	11%
Red Maple	(11%)	(1%)	(10%)	(1%)
Red Oak	21%	39%	3%	6%

Dendrology clue #5: The truffle – "a rather ugly, but delicious, fungus" – grows anywhere from a couple of inches to a foot underground, near the roots of _____ or beech trees. In fact, in France the southern province of Quercy is named from the Latin *quercus*, for its prized truffle promoting _____ trees.

FOREST CERTIFICATION SYSTEMS - A Primer

First a definition of forest certification: "Forest certification means that forests are managed in a sustainable manner and that trees are harvested with environmentally sound practices. These management practices are certified by objective (disinterested) third parties. Landowner participation is voluntary".

Forest certification is a seal of approval for wood and paper products, providing consumers with the assurance that the product they are buying comes from a sustainably and ecologically managed forest. Forest Certification was developed more than a decade ago in response to deforestation and poor logging practices, particularly in the tropics, but soon found a home in the temperate regions as well. This process has often been compared to "organic certification" of food products which provides the consumer with the knowledge that the food they are buying is free of non –organic pesticides and fertilizers. Consumers of certified forest products are assured that the product they are buying comes from a well-managed forest. Consumer demand is a powerful force and has been the driver for several retailers to seek green certified wood products.

Forests provide more than wood products; they provide wildlife habitat, clean water, they create oxygen and are sinks for carbon. Forests also provide homes for people, including many of the earth's last remaining indigenous populations. A certified forest may take into consideration all of these components of a forest by looking at species diversity, age class, sustainable extraction, natural regeneration, riparian buffer management, as well as worker and indigenous people's rights.

In the United States there are many organizations or "certification systems" that offer verification that forests are being managed sustainably: the Forest Stewardship Council or FSC an international organization; the Sustainable Forestry Initiative (SFI), and the American Tree Farm System (ATFS), both third-party certified under the Program for the Endorsement of Forest Certification Systems (PEFC) an international sponsor; and Green Tag are the main systems. Keep in mind that even these systems are continually improving their processes and standards – so what you thought you knew about them may have changed – it is up to you to check them out.

Which is the better system? All the systems are good systems, and the practical answer may be that consideration should be given to being in one of the systems. Having a forest green certified may be a public statement that you set a high standard in managing the health and sustainability of your forest, and this option should be considered. However, we recognize that many small woodlot owners find that working closely with their consulting forester is sufficient for their needs.

It should be noted these certification systems are highly competitive, and each has claimed certain advantages over the others. They also vary dramatically in cost and number of standards. In this article we are not advocating any one system – for us, frankly, that would be political suicide. *Our job is to let you know they exist and encourage you to explore and find which one suits your management objectives best.*

How important is certification in Vermont? At this time, few markets for raw forest products in Vermont are demanding certified wood and even fewer are paying a premium for that wood. It is expected that most markets in the United States, and the world, will soon demand forest certification for all of their incoming raw wood product supply and as the demand for certified wood increases, there is undoubtedly a strong likelihood that an increase in value to the landowner will follow. It may in fact get to a point where a landowners'; very ability to market raw forest products may depend upon forest certification.

To get you started in finding out which certification system may be right for you, your budget, and your ethic check out the following websites:

- Forest Stewardship Council (FSC): www.fsc.org
- Sustainable Forestry Initiative (SFI): wwwaboutsfi.org
- Vermont Woodlands Association- sponsors the American Tree Farm System (ATFS or Tree Farm) www.vermontwoodlands.org
- Green Tag is a program of the National Woodland Owners Association: www.greentag.org
- Vermont Family Forests (VFF) – sponsors a Forest Stewardship Council (FSC) program: www.familyforests.org
- Rainforest Alliance – sponsors an FSC SmartWood program which is facilitated in Vermont by the National Wildlife Federation: www.rainforest-alliance.org/smartwood
- Program for the Endorsement of Forest Certification Systems (PEFC) www.pefc.org

Dendrology clue #6: Leaves of this tree are mostly bristle-tipped lobes compared to this tree's "sister" *leucobalanous* whose leaves are without spinose teeth or bristle-tipped lobes.

In conclusion: As a forest landowner you have probably come to the realization that your woodland is a vibrant, alive system. It is constantly changing and never predictable. Making decisions about the management of a woodlot can be an intimidating task. Working with a forester is critical, but it can still be confusing. This confusion is due in part to the terminology of silviculture, which is the art and science of managing forests for desired outcomes. Silviculture tries to look at the entire forest in order to sustain its health and complexity over a very long time period. Forest management tries to mimic nature while achieving the goals of the individual landowner. It may take generations of ownership to achieve these management goals. As a subscriber to the Forestry Letter Series you already have an interest in your property and a desire to learn about what positive impacts you can have on your property. It is crucial that you, the landowner , be as informed as possible. Below is a list of resources that we encourage you to look over. If you have not had the chance to talk with a forester about your land a great place to start is calling your county forester.

Lessons Learned from landowner, consulting forester & Vermont Woodlands Association representative: Paul Harwood

From a personal perspective as a professional forester and a woodlot owner for over thirty years, I have probably experienced all or most of the shortcomings of one who should have known better. Fortunately, my woodlot management experience has taught me, often by example, where I have gone wrong. In the interest of education, I would highlight those lessons and offer the following suggestions:

- Don't hire your logger cousin or close friend to cut timber from your woodlot.
- Excessive cutting can alter wind patterns and could destroy the very trees you are trying to save or release; expect the worst and you will be prepared.
- Avoid cutting everything that appears to be dead or defective for firewood. Those trees often provide homes for wildlife or partial shade for the replacement forest.
- Insist on having professional supervision of your harvesting operation no matter how small. Money spent on a forestry consultant is money well spent.
- Seek professional advice even if it hurts—financially as well as personally.
- Act short term and think long term. Remember, trees take longer to mature than people.
- If you hate hemlocks, poplars or red maples,-don't hate them all. They all serve a purpose, even if you can't easily recognize it.
- One mans' maple veneer is another's firewood. Everyone's goals and objectives are different.
- Being self-sufficient always takes longer. Sometimes it helps to have someone else do the heavy work.
- Wolf trees are good for something,-sometimes.
- The best wood to burn is not necessarily at your doorstep or closest to the road.
- Utilities have the right-of-way; don't ever doubt it!
- One trees' disease is another's fertilizer.
- If you're felling trees,-think the worst case scenario first and plan accordingly.
- If you don't have it in writing-chances are you don't have it!

Dendrology clue #7: Good seed or fruit crops occur at 2 to 5 year intervals and take two-seasons to mature compared to "sister" *leucobalanus* whose fruit matures in one season.

Resources, references and websites:

Oak—The Frame of Civilization, by William Bryant Logan. W.W. Norton & co. Inc. 2005.

Working With Your Woodland: A Landowners Guide, Revised Edition by Mollie Beattie, Lynn Levine and Charles Thompson. University Press of New England. 1993

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.

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.

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

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 Layayette, IN 47907

www.nh.gov/revenue/munc_prop/avgstumpval.htm (New Hampshire stumpage price report)

www.vermontwoodlands.org (Vermont Woodlands Association)

www.vtfpr.org (VT Agency of Natural Resources, Department Forests, Parks and Recreation)

www.nrcs.usda.gov/technical (Natural Resources Conservation Service)

www.plants.usda.gov (USDA Plants Database)

www.vermontwoodlands.org/certified-foresters.asp (VT Woodlands Certified Consulting Foresters)

www.arborday.org (Arbor Day Foundation)

www.fs.fed.us/ (US Forest Service)

www.privateforest.org (Nature Conservancy/US Forest Service). "Forest Management 101"

www.fpr.org/resource/for_forres_acceptman.cfm Vermont AMPs: Acceptable Management Practices

http://files.dnr.state.mn.us/assistance/backyard/treecare/forest_health/links.xls Forest Health Issues (a very comprehensive list in excel format):

The Northern Vermont RC&D-Resource Conservation & Development Council would like to thank the lead authors for this letter: Dave McMath, Caledonia NRCD Supervisor; Paul Harwood, VWA Vice-Chair and Al Robertson, Chairman, VT Tree Farm Program Committee 802-626-3590 www.vermontwoodlands.org

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Dendrology Challenge Quiz Answer:
Eastern Red Oak, Quercus rubra
Question #5 – Answer is just "Oak".

Quiz Sources: All Oak tidbits were found in the delightful book, "Red Oaks & Black Birches – The Science and Lore of Trees" by Rebecca Rupp. 1990. A Garden Way Publishing Book which provides cool lore on 20 popular trees in your woodlot.
Image Sources: U.S. Forest Service, Wikipedia, Peterson and Sibley Field Guides, Pennsylvania Department of Forestry, Chesterfieldoutdoors.com and Hainaultforest.com

To contact RC&D about this letter or the Forestry Letter Series call 802-828-4595 or beth_ann.finlay@vt.usda.gov.

Coming up next… our final issue in the series, #6 Protecting Your Forest Asset$