Cornell University Cooperative Extension

Forest Connect

Supporting Sustainable Management of Private Woodlands

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Selecting Which Trees to Include in a Harvest

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Questions about whether or not to cut low-value or "firewood" trees during a harvest have at least three facets to consider. These are (i) is there benefit or harm in cutting a firewood-quality tree (and is it really a firewood-quality tree), (ii) what guidance do silvicultural principles offer in thinking about which trees to harvest, and (iii) what are the specific attributes of trees that should be retained versus those to be cut? Harvests often have a financial outcome, so the question of whether to cut a low value, presumably low-grade, tree is slightly more nuanced. While it might be possible to differentiate among low-grade, low-value and firewood-quality trees, those distinctions aren't relevant for the question of whether or not to cut.

Benefits: Financial, Logistical and Silvicultural

Benefits from cutting a low-value or low-grade tree might include a combination of financial, logistical, and silvicultural. The latter is addressed below. Low-grade trees are those used in markets that provide products having lesser and broad standards of quality and that sell for little money. Examples of these markets include firewood, pulpwood, chips or pellets. As a specific example for firewood (Figure 1), a tree that is 12 inches dbh has a volume that is less than 0.25 cord and maybe 1000 lbs green weight depending on species. The most recent NYSDEC stumpage price report lists firewood value at $6 - $12/cord

Figure 1. The value of cutting a low-grade tree is largely from the benefit of increased sunlight to adjacent trees, in this case a black cherry. Trees are not created equally, and this tree is worth a couple dollars.

on the stump, and values for other low-grade products are comparable. It's a bit disheartening to look at a towering tree that might be 50 to 70 years old and realize that its best financial value is less than a flat of tomato starts from your local garden center. Perhaps this is why firewood cutting for personal use is one of the most common woodland owner activities. Further, it costs the logger the same effort and machine time to fell and move a low value as high value trees of similar size. It's doubtful there is a substantial profit motive to cut an additional low-value tree, especially during a commercial harvest.

It's worth mentioning that unscrupulous people might suggest that a tree is of lower grade and value than it is, and thus inconsequential to cut. Avoid this concern by working with a reputable forester and logger.

Logistically, there may be benefit for an unmarked tree to be added into a harvest to simplify the felling or maneuvering of other trees and logs. It is possible that when the forester marked the trees to cut, there was oversight on some reality of applied physics that warrants cutting an additional tree that complicates the harvest or moving of logs. The argument on logistics is palatable once or twice, but becomes suspicious with multiple occurrences.

Figure 2. The Game of Logging teaches loggers and landowners how to directionally fell a tree. The feller can then decide where to safely position the tree to avoid damage to other trees.

Related to logistics is the potential for damage to adjacent trees. Loggers who are trained in and who use directional felling as taught through the Game of Logging program (Figure 2) are usually able to fell most trees in a manner that avoids damage to residuals. While the Game of Logging doesn't override the laws of physics, loggers fell trees as part of their profession and are oft en quite talented. Many take great pride in their ability to make a tree behave. If there are particular attributes of your woodland that are essential to protect, have a specifi c and direct conversation about your objectives with the person running the chainsaw and the skidder.

Silvicultural Motives to Remove Trees

Silviculture is a science that guides management decisions for ownership objectives related to the establishment, composition (i.e., mixture of species), growth and quality of forest vegetation. It is through these four goals that the retention or removal of a single stem might infl uence the future stand. Admittedly, a single stem has minimal impact, but the principles are worth reviewing.

Canopy trees infl uence establishment through changes in local environment and the provision of seed or root sprouts. Th e s pecifi c benefi ts versus detriments of the tree in question depend on many factors. Trees infl uence the local environment, and thus the establishment of seedlings, through shading, slowing of wind currents, and perhaps changes to soil moisture through root uptake of water. Trees also provide seed. If the species is desired for ownership objectives, the seed

Figure 3. The abundance of seeds depends in large part on having a sufficient number of healthy and mature trees of the desired species present. Many of these red oak acorns will germinate into oak seedlings.

Figure 4. In some specific cases girdling is an appropriate tactic to allow other trees more growing space. The girdled tree eventually falls, and not necessarily when or where it is most opportune.

is likely of benefit. Some species are less desired, or are overly abundant and removing one or more may balance the species mixture of the seed in the forest. In some cases, retaining a tree may create an environment that limits the establishment of some less than desirable trees.

Many owners have objectives that connect directly to composition, or the mixture of species present. Adjusting the proportion of stems among the various species influences these objectives. Species-specific objectives might include future value for timber, maple syrup production, fruit for wildlife, fall color, and aesthetics. The species retained will influence the seeds distributed (Figure 3). Stems removed reduce the prevalence of that species as future germinants.

Tree growth is directly related to the availability of sunlight. Removing one tree will almost certainly benefit an adjacent residual tree. This is perhaps the most immediate benefit of cutting a tree of low value because of the increased growth on the residual tree that receives more sunlight. Numerous studies report that thinning to ensure adequate sunlight to desired trees increases the growth of those trees. The extent of increased growth varies, but a 50% increase of various growth metrics (e.g., diameter increment, basal area increment, volume increment) wouldn't be a surprise.

Quality can be assessed at the tree and the stand level. At the tree level, removing a low value tree could increase growth of clear wood on an adjacent residual tree. As the residual tree accumulates wood, the inner core with knots and defects is buried by wood with no or less defect. Through time, the quality of that tree increases. At the stand level, a tree is low value because of either unmarketable species or poor quality stem. In either case, removing that tree while retaining high value trees results in a higher proportion of high value trees.

An additional perspective on quality is how a stem or species contributes to other objectives. Trees, live or girdled, might have value for wildlife, fall color, aesthetics or other values. Be thoughtful about whether and where to create a snag by girdling (Figure 4).

While there are silvicultural advantages to removing a low value tree, there may also be disadvantages. A principle disadvantage is an unfavorable shift to suboptimal stocking. Stocking is the quantity of a resource (e.g., trees) relative to the capacity of an area to provide for the needs of that resource (e.g., sunlight on

an acre). Forest stocking is often reported as basal area in sq. feet per acre. Reducing stocking too much may cause an undesired understory response, or allow for too much wind turbulence. Conversely, retaining too much stocking can stunt the growth of desired established seedlings. The details defining the correct stocking level are beyond the scope here, but can be discussed with your forester.

Selection Criteria for Trees to Cut or Retain

There are exceptions to criteria for which trees to cut or retain, but some general principles are helpful. In general, focus on what should or could be retained rather than what should be cut.

- Focusing on those trees to retain requires an acceptance of the relativism of trees…you can only work with the best of what you have. Some woodlot have been high-graded or selectively logged such that few "good" trees remain. While an owner might decide to aggressively reset their woods and start over, more often they accept that perfect is the enemy of good (or sometimes of mediocre). Avoid the temptation to cut all the less-than-perfect trees.
- Retain species that are aligned with the soils of the stand (Figure 5) and that support your ownership objectives. Strive for a variety of species based on what is available. Sometimes species establish on soils for which they are not well suited. Those stems are of poor vigor, low resilience to stressors, and generally perform poorly. They offer little opportunity for the future, and removing them may provide some benefit.
- In addition to species, the attribute of a tree mostly likely to connect with an owner's objective is stem form. Beauty is in the eye of the beholder, so a stem of given form might be perfect for one owner and a bane for another owner. The beauty assigned to a tree might change depending on the specific location on the property.
- A tree's vigor fundamentally relates to its ability to photosynthesize. Thus, the tree's crown is central to the success of a tree as a tree. In a managed forest, trees are eventually cut. Until the regeneration phase of a stand, retaining upper canopy trees with balanced, deep crowns that lack dieback to ensure those trees are most likely to take advantage of any sunlight they receive and disperse seed.
- Some trees with weak forks, severe canker damage or other physical injury may be more likely than not to break or fail (Figure 6). Not all of them will, as evidenced by large trees with these features. However, when thinning a woods, removing trees with low structural integrity reduces the risk that tree will shade a more viable trees before the weak tree eventually succumbs.

Figure 5. Sugar maple is a good example of a species that is finicky about its site. Sugar maple doesn't perform well on these poorly drained soils as evidenced by the two trees with stubby ("stagheaded") tops.

Figure 6. A canker or other defect may predispose a tree to eventually fail through breaking of the stem. These are good candidates for removal sooner than later to allow the felling to be safe and to reallocate that growing space to another species.

- Trees that may die before the next opportunity to harvest are often, but not always, better to harvest during the current harvest. This is particularly true for the owner who sees some tangible utility in that tree. Some owners are able to get into their woods several times a year, while others are physically remote. The owner with regular access can monitor tree vigor, and if they are DIY owners, can harvest as needed to capture value. Owners without the option for direct involvement need to capture the value of trees before they die.

For additional information on woodland management go to:
www.ForestConnect.com & www.CornellForestConnect.ning.com

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