

## APPENDIX A

### **Crop Tree Management Inventory and Marking Procedures**

*by*

*Arlyn W. Perkey & H. Clay Smith*



*Communicating with the landowner is a critical part of Crop Tree Management. Just as you inventory the forest, you must also inventory landowners' interests and feelings about their woodlots.*

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These inventory and marking procedures are intended to help practitioners develop effective and efficient Crop Tree Management application techniques. Based on personal experience, these recommendations come from application in demonstration areas on public land and prescriptions administered on small, private woodlots.

The Crop Tree Management System involves careful identification of landowner property goals, establishment of stand-specific objectives, and development of crop tree selection criteria.



*Look for clues that might reveal stand history, such as remnants of open-grown pasture trees, indications of fences, or old stumps.*

Generally, objectives are accomplished by giving the crop trees a crown-touching release. This means the entire perimeter of each crop tree crown is freed from competing crowns. Neighboring trees are cut if their crowns touch or extend over the crown of the crop tree. It is not essential to cut trees that are clearly in the overtopped crown class position because they are well beneath the crop tree crowns and unable to compete.

To ensure a complete release, imagine the crop tree crown divided into four separate quadrants, or sides. Evaluate each side for competition from neighboring trees. A crop tree is not fully released unless it is free from crown competition on all four sides.

It is permissible to have two crop trees adjoining, in which case they each receive a crown-touching release on only three sides. However, their combined crown perimeter must be fully released. The intensity of cutting is adjusted by changing the number of crop trees to be released, not the number of sides of the crowns released.

We recommend the following steps:

1. Talk with the landowner to learn current and potential future uses of the property. Assist your client in articulating property goals.

2. Do a walk-through evaluation of the woodlot, making visual observations about species composition by size and crown class. Assess the history of each stand and its progression in terms of ecological succession. For example, is it an old field with pioneer species growing on it? Has it been forested for many years and had previous timber-cutting activity? Is it an even-aged stand or a two-aged stand?

3. Discuss the potential of each stand with the landowner. Describe how the individual stands can be managed to contribute to the overall property goals. Reach agreement with the landowner about what the stand-specific objectives are. If trade-offs must be made among multiple objectives, determine which of them will have the highest priority for accomplishment.

4. Draft crop tree selection criteria to meet the stand-specific objectives. The quality of crop trees varies from site to site and from stand to stand, so it is difficult to draft standards that have universal application.

A tree that would not qualify as a crop tree on a good site in an excellent stand may be the best tree available on a poorer, previously mismanaged site. When selecting crop trees, it will often be a matter of picking the best available.

If financial return is a primary objective, precommercial work should begin in stands with crop trees that have the best potential to provide the income desired in the anticipated time frame. Frequently, these opportunities occur on the best growing sites.

Crop tree selection criteria should be established for each stand to help you judge which trees are the best and to verbalize minimum crop tree standards. For example, to increase income from timber crop trees, the selection criteria should focus on the tree characteristics that indicate it is likely to grow rapidly and produce high-quality products.

When selecting timber crop trees, choose dominant/codominant trees with no dead branches in the upper crown. Trees with large crowns relative to their dbh are much less likely to develop epicormic branches than trees with small, sparse crowns.



*This stand has a history of high-grading and livestock grazing. The red oak in the center is one of the few crop trees available that will meet both the landowner's wildlife and timber objectives.*



*The one-fifth-acre fixed radius plot is best to use when communicating with the landowner about the prescription. However, the variable radius plot is much faster to use for obtaining inventory information efficiently.*

Look for indicators (i.e. dormant buds) of the tree's probability of degrading in quality because of epicormic branches. Don't select trees with existing epicormic branches (alive or dead) on the butt log. It is very likely these trees will have additional epicormic branching problems.

5. Take systematic points throughout each stand. Analyze this information to obtain an estimate of the number of trees per acre that meet the crop tree selection criteria. The species composition and size of the trees may also be relevant to the stand's capability for accomplishing objectives.

On Pages A9 and A10 is a tally sheet with sample inventory data recorded before implementation of a Crop Tree Management prescription. Crop trees are identified according to category ("T" for Timber, "W" for Wildlife, "A" for Aesthetic, and/or "WQ" for Water Quality) in the ***Crop Tree*** column.

When doing pretreatment inventories, competing trees that will be cut to release crop trees can be identified on the tally sheet in the ***Other Tree*** column with a symbol like "C" for cut. Trees that are not competing with crop trees can be identified with an "L" for leave. This data can then be analyzed to provide a per-acre estimate of the number of crop trees to be released, the number of trees to be cut, and the total number of trees left in the stand.

6. Conversations with the landowner may give you an indication of how intensively your client is willing to cut the stand. This will help you judge the number of crop trees you can plan to release.

Using the stand-specific objectives, crop tree selection criteria, information from the stand inventory, and your preliminary assessment of the landowner's tolerance for degree of cutting, develop a Crop Tree Management treatment proposal. Identify the species, size class, and physical characteristics of the trees you propose to manage. These should be the trees identified using your crop tree selection criteria.

If possible, visit the woodlot with the landowner. Using a one-fifth-acre circular plot (52.7-foot radius), demonstrate what the treatment will look like. Designate the proposed crop trees with flagging. With a different color of flagging, identify trees that would be cut to release them. This exercise helps the landowner visualize how the area will appear after treatment. Explain how doing the work will accomplish the stand-specific objectives.

If the landowner indicates the proposed intensity of cutting is too heavy or too light, adjust the amount of cutting by decreasing or increasing the number of crop trees to be released. While on the plot with the landowner, thoroughly review the stand-specific objectives for each stand, the crop tree selection criteria, and the number of crop trees to be released. This is probably the best opportunity for the landowner to obtain a clear perception of what the proposed treatment is, what it will look like, and how doing it will accomplish the overall property goals.

7. Decide whether the trees to be cut constitute a marketable volume of timber. In many instances this will be obvious without any additional detailed analysis of the inventory data. In other cases, it may be appropriate to not only further analyze existing plot data, but also to do additional cruising to determine if the trees to be cut are marketable.

8. If the cut trees are to be sold, determine if you should do "cut tree" marking as well as crop tree marking. If so, be sure to use a different color of paint to clearly differentiate the cut trees from the crop trees. It is easier and less time consuming to mark crop trees only. However, cut tree marking may make supervision of the cutting easier.

Cut tree marking is appropriate if the cutting crew has not been trained to do a crown-touching release on selected crop trees. It may also be advisable if trees in the stand are of high value. You need to be certain the cut tree volume estimate includes only competing trees. In lower-value stands, crop tree marking may be sufficient if cutting crews receive adequate training and supervision.



*Showing landowners an example of how the stand will be marked helps them see why cutting competing trees helps the crop trees accelerate their growth and subsequent production of benefits.*

If cut tree marking is done with leaves on, it is often difficult to see all of the trees whose crowns are touching the crop tree. This is especially true if there are many midstory trees obscuring visibility of overstory crowns. Cut tree marking is easier and quicker to do during the dormant season.

It is preferable to do crop tree marking during the growing season. The crown vigor of potential crop trees can be more adequately evaluated during this period.

If, for efficiency or other reasons, it is necessary to do both crop tree and cut tree marking during the same season, it is usually more practical to do both jobs during the dormant season when leaves do not obscure the crowns.

Use paint to identify the crop trees. If properly marked, they will remain visible during and after the cutting operation. Flagging of crop trees is sufficient for purposes of staying organized during the marking process, but flagging will frequently be destroyed during cutting.



*This tree feller is working in a stand that has only the crop trees marked. He knows how to apply a "crown-touching" release.*

9. If the cut trees are not marketable, consider a precommercial treatment. If the stand is on private, non-industrial ownership, cost-share programs like the Forestry Incentives Program (FIP), Agricultural Conservation Program (ACP), and Stewardship Incentive Program (SIP) may be available to help pay the cost of doing the treatment. Compare the landowner's property goals and the stand characteristics with the available cost-share program objectives, and select the best match-up.

10. If a precommercial treatment is to be performed, evaluate the training and experience of the cutting crew. Determine if it is appropriate to do cut tree marking, crop tree marking, or both.

With precommercial treatments, crop tree marking will often be sufficient, and identifying crop trees with flagging may be adequate. However, if flagging is used, the treatment should be done soon after the crop trees are identified. Because flagging can fall off or be removed, it is not a good idea to rely on it for any long-term identification of crop trees.

11. Some landowners may be willing to release the maximum number of crop trees that meet the selection criteria. Applying a complete crown-touching release to each will often result in fairly heavy cutting. However, when this is the case, the designation of crop trees is fairly simple.

When you begin to mark, look for the best crop tree; the one that best meets the crop tree selection criteria for one or more of the stand-specific objectives. Designate it with flagging or paint.

Look for the next best crop tree and designate it. If its crown is touching the first one selected, you know you can't have a third crop tree touching either of those two crowns. Move through the stand designating as many crop trees as you can that meet the crop tree selection criteria. However, be careful not to allow occurrences of more than two crop tree crowns that touch each other. Each crop tree will have at least a three-sided release, and some will have a four-sided release.

When evaluating trees for selection as crop trees, you will often be forced to make difficult choices. Remember, crop trees are those that best meet the selection criteria. When you have multiple objectives, not every crop tree can meet the criteria for all objectives.

For example, some crop trees may qualify only as timber crop trees. Others may qualify just as wildlife crop trees. However, there may be some trees in the stand that qualify as both timber and wildlife crop trees. Therefore, if both timber and wildlife objectives are important to your client, these trees will be highly preferred for selection as crop trees. You must strive to select the combination of crop trees that best meet the objective or combination of objectives for the stand.

For stands with multiple objectives, selecting the optimum combination of crop trees to accomplish them is not an exact science. In mixed species stands, you may frequently be forced to place a priority on objectives and make trade-offs when selecting individual crop trees. An accurate assessment of what is most important to the landowner will make these crop tree selection decisions much easier.



*Stands with a mixture of species provide excellent opportunities for accomplishing a combination of objectives.*

12. The easiest way to release a specified number of crop trees per acre is to visualize the one-fifth-acre circular plot, and imagine how the proportional number of trees would fit on it. For example, releasing 20 crop trees per acre means there would be four on a one-fifth-acre plot.

If you picture yourself at the center of the plot, two crop trees would be within about 50 feet behind you and two would be within 50 feet in front of you. The exact location and spacing of these trees isn't critical. Locate the four best trees on the imaginary one-fifth-acre radius plot, and as long as no more than two of their crowns are touching, their spacing is not a major consideration.

The lighter the cutting (low number of crop trees released), the more trees left in the residual stand. Trees with crowns that do not touch crop trees, don't get marked for cutting. You may choose to cut some of them if for any reason they are undesirable. However, if many additional trees are marked, it will affect the appearance of the stand with regard to how heavily it gets cut.

Using these procedures, the inventorying and marking process is drastically different from marking to a specified basal area. However, having done both crop tree marking and basal area cutting for several demonstration areas, we have found crop tree marking easier to do. In addition, there is considerable satisfaction that comes from knowing the crop trees selected for management are the ones with the greatest potential to meet the property goals important to the landowner.



*In lighter cuttings, there will be more residual trees left in the stand. The trees pictured here were not in direct competition with the crop trees, so they did not get cut.*



