Appendix E: Silvicultural Prescriptions

Regeneration Treatment to allow the establishment of a new age class of trees or to assist regeneration already present. Methods of regeneration differ by intensity, timing, and tree arrangement. The particular regeneration system should be tailored to the site, species, and objectives of the particular property.

Even-aged Systems

1. **Shelterwood**

   Preparation -- is an intermediate cut conducted with the objective of improving the seed bearing capacity of the residual stand. Openings are made in the canopy by removing the unacceptable growing stock, typically trees in the lower crown classes, to the extent necessary to permit the development of vigorous seed bearers. The cutting may also assist in the development of wind-firm trees. Well-tended stands usually have adequate numbers of vigorous trees for abundant seed production, in which case the preparatory cutting may be bypassed.

   Seed Tree -- is conducted within a single operation with the objective of creating enough growing space in the canopy, as well as increasing light on the forest floor, in order to provide favorable conditions to establish regeneration. The trees that are retained as seed trees must be full-crowned, healthy trees with good form. Therefore, the trees removed in this stage are the least desirable remaining in the stand. It is important that trees of undesirable species be cut or killed regardless of crown class. Seed cuttings should be carried out during a year in which the target species bear seed in abundance. The intensity and pattern of the cutting should be adjusted to the target species so the residual stand provides optimum conditions for germination and establishment of the target species.

   Removal -- the largest and most vigorous trees left from the seed tree cut usually have the greatest capacity to increase in value and are the ones reserved until the removal cut. This final cut removes the overstory once a new cohort has adequate numbers of desirable trees and they have grown to some minimal threshold size to assure their survival. In some instances a minimal number of trees may be left as "standards" that may be harvested in the future.

2. **Seed Tree**

   Preparation -- is an intermediate cut conducted with the objective of improving the seed bearing capacity of the residual stand. Openings are made in the canopy by removing the unacceptable growing stock to the extent necessary to permit the development of vigorous seed bearers. The cutting may also assist the development of wind firm trees. Well-tended stands usually have adequate numbers of good-vigor trees for abundant seed production, in which case the preparatory cutting may be bypassed.

   Seed Tree -- leaves only widely scattered trees of excellent phenotypes to serve as a seed source; but, unlike the shelterwood system, the sparse canopy cover has little effect on conditions of the environment near the ground. The seed trees must be light-seeded species with a full healthy crown, phenotypically superior, prolific in seeding, and sturdy and healthy enough to withstand wind and exposure and remain alive until the removal cutting. The number of seed trees per acre retained will

depend upon the target species' and their regeneration requirements. The trees removed in the seed cuttings are the least desirable remaining in the stand. It is particularly important that trees other than target species be cut or killed regardless of crown class. Seed cuttings should be carried out during a year in which the desirable species bear seed in abundance. The residual seed trees should be spaced to provide an adequate amount of seed to assure regeneration of the desired species.

Removal -- The largest and most vigorous trees left from the seed tree cut usually have the greatest capacity to increase in value and so are the ones most logically reserved until the removal cut. This final cut removes the overstory once a new cohort has adequate numbers of desirable trees and they have grown to some minimal threshold size to assure their survival. In some instances a minimal number of trees may be left as "standards" that may be harvested in the future.

3. **Clearcut --** this method involves the removal of the entire stand in one cutting, creating a new even-aged stand. Generally, it is specified that all trees greater than a particular diameter will be cut. The term clearcut, however, should not be applied to harvests that remove only the merchantable trees, leaving behind trees of small size, poor quality, or inferior species. Reproduction may be obtained artificially, by natural seeding, or from trees cut in the clearing operation. Clearcut size and shape will depend upon the seed availability of the target species. Common clearcut methods include patch, strip and stand.

Intermediate -- periodic releasing, improvement, and thinning treatments can be made over the rotation to improve stand health, composition, quality and to capture the value of mortality. The healthiest and highest quality trees should be retained until the regeneration harvest. The establishment of regeneration is a concern only at the end of the rotation.

Noncommercial Operations:

weeding -- a treatment during the seedling stage to eliminate or suppress mainly herbaceous plants and shrubs that overtop or interfere with desirable young trees.

cleaning -- a treatment during the sapling stage to free selected trees from competition of overtopping trees of comparable age, and to favor the trees of better species and quality. Cleaning may also include removing woody vines and shrubs that overtop or seem likely to suppress desirable trees not past sapling stage.

liberation – differs from weeding and cleaning in the kind and age of vegetation removed, and the nature of the stand treated. Liberation cutting frees trees not past sapling stage from competition of older overtopping trees and vegetation.

pre-commercial thin – is designed to increase the growth and enhance the quality of the stand. The cut material is too small or of such quality as to not be salable under normal market conditions.

Commercial Operations:

improvement -- intermediate treatment in stands past sapling stage which remove damaged, defective, or otherwise imperfect trees in the main canopy. It is specifically designed to

enhance the growth and development of the better trees that remain. It serves primarily to upgrade the quality of an intermediate-aged stand and does not necessarily regulate relative density.

commercial thin -- is designed to enhance the growth and quality of healthy trees with dominant or co-dominant position exhibiting the best form. There is sufficient volume and quality removed to cover the costs of improvement work and may also return some profit to the landowner.
Examples include: thinning from above, thinning from below, mechanical, and free.

Sanitation and **salvage** cuttings do have some features in common with thinnings and other tending operations. First, they all remove potential mortality trees from forest stands, even though the reason differs from one method to another. Also, all of the cuttings have potential financial value by increasing recoverable yields. Salvage or sanitation cuttings serve primarily to reduce financial losses from a recognizable injurious agent.

Salvage – an intermediate treatment removing dead or badly damaged trees to recover their value. Salvage cutting address financial rather than ecological needs.

Sanitation – an intermediate treatment to utilize high risk trees as an early response to pending pest and disease problems. Sanitation cutting removes susceptible and host trees to prevent the build up or spread of insects and diseases.

Uneven-age

Selection – a selection system should be used to create or perpetuate stands with at least three age classes. It is an uneven-aged system in which regeneration and intermediate treatments are implemented in the same entry in order to create a stable stand structure in which diameter classes occupy an equal proportion of the site. Since the selection system removes only a relatively small part of the stocking at any single entry, compared to an even-aged system, the growing conditions created favor species of mid to high shade tolerance. The intensity of the cutting will be dependent on the length of the desired cutting cycle. In the selection system, consideration must be given to both a regeneration and an intermediate component.

The **regeneration component** of the harvest involves the removal of large diameter trees in order to start a new age class. Harvesting should concentrate on removing unacceptable growing stock leaving the best quality trees for a seed source, to increase their value through growth and to help concentrate growth potential onto younger trees with desirable attributes. Two reproduction methods are generally recognized differing only in the spatial distribution of the financially mature trees to be harvested and the resulting regeneration.

Single-tree Selection Method creates regeneration openings that cover an area equivalent to the crown spread of a single mature tree. These openings are spaced more or less uniformly across a stand to improve environmental conditions sufficiently to promote a new age class that is typically shade tolerant.

Group Selection Method creates regeneration openings by removing mature trees in small groups or clusters. These openings are fewer in number, but larger in size than the single-tree method. The group selection method is typically used in the regeneration of species with a mid-level shade tolerance.

Harvests that do not include the intermediate component of the selection system create unregulated crowding in the pole and sapling classes and a reduced production potential.

The **intermediate component** is an integral part of the selection system necessary to achieve the desired stand structure while assuring the stand's ability to provide a stable flow of values over a multi-year time frame. Intermediate treatments in the younger age-classes improve growth rates on acceptable growing stock by removing trees of poor form and vigor, freeing growing space and available resources for the better quality crop trees.

Non-system Harvests

Crop Tree Management: Has no precise definition, except for the emphasis on crop tree release and is best classified as an intermediate treatment. In applying a crop tree method, crop trees must first be identified based on landowner objectives. In general crop tree characteristics include: Dominant/Co-dominant trees, high-value commercial species, expected longevity of 20+ years, species well-adapted to the site. A crop tree simply represents the best main canopy trees available. Crop trees should be in a dominant or co-dominant crown position, with good tree form, and well-spaced from other crop trees. *In addition* to the above crop tree attributes, crop trees may also have additional characteristics for objectives other than timber. For example, wildlife objectives include crop trees that can produce mast and cavity/den trees. Spacing between crop trees will depend on landowner objectives and the location of available crop trees in the stand. The number of Crop trees/acre should assure full site utilization. Only trees in direct competition with the crop trees should be removed. The thinning frees space around all sides of the crowns, and promotes rapid diameter increase. In crop tree management overtopped trees may be removed or retained, and even some intermediates may be as trainers.

Christmas Tree Management the establishment, perpetuation and tending of Christmas trees as a crop.

CH. 132 Non-system Harvests: Exceptions to or deviations from the above listed silvicultural systems shall require a narrative justification and approval by the Director or Director's agent. The justification should be based upon silvicultural principles and shall state the future desired condition of the stand.