

FOREST MANAGEMENT PLAN
FOR
AMHERST CONSERVATION COMMISSION
AMHERST, NEW HAMPSHIRE
1996
(Revised 1999)

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Introduction

This plan was prepared at the request of the Amherst Conservation Commission, Amherst, New Hampshire for 6 of their upland forested properties located in Amherst. Its purpose is to provide the Amherst Conservation Commission with information concerning the existing forest conditions and to make recommendations for the management of their upland forested properties for the next 20 year period.

The specific tasks of this plan were:

1. Conduct a forest inventory during July and August 1996 (Dacquino Lot - 1999).
2. Analyze the inventory, report the results, and consult with the Conservation Commission during August, September, and October 1996 to clarify management objectives and discuss recommendations.
3. Develop the finalized plan during October and November 1996. Revised Plan - August 1999

Management Objectives

The landowners' objectives for the management of these woodlots are as follows, in the order of their relative importance:

1. **High** - Wildlife/Recreation/Aesthetics
2. **Medium** - Income/Wood Products

The principle motivators for undertaking this management program are: a. to inventory property's forested resource and, b. assess options for conserving the forested uplands while improving wildlife habitat, recreational opportunities, aesthetics, and cash flow.

The management statement for the Town of Amherst for these subject properties can be stated as: *An extended rotation management philosophy with timber as a major consideration, but with considerable associated nontimber values (wildlife, recreation, and aesthetics).*

Inventory Procedures

The sawtimber and cordwood inventory is based on a variable plot cruise technique. At each intersection of the cruise grid (295' square grid), a sample plot was established and trees were tallied by using a 10 factor wedge prism. A total of 381 plots were established during the inventory. The trees were tallied by species, 2" dbh class, product (sawtimber or cordwood) and merchantable height. The total volume for these properties is calculated at the 95% confidence interval with a standard error of 14% for the sawtimber and 12% for the cordwood. In other words, if the same procedure is repeated 100 times, the estimated volumes will be within the standard errors 95 out of 100 times (see Appendix 2 & 3). The Dacquino Lot (1999) had 39 plots on a 275' square grid.

In addition, at each plot center, ocular estimates were made of the relative occurrence (none, low, medium, high) of the following structural wildlife features: cavity/den trees, snags/perches, mast, browse, shrub layer, midstory layer, groundcover, and dead/down trees.

Forested habitats were mapped while the inventory was being conducted and consist of areas where a specific grouping of trees with similar characteristics dominate an area (i.e. age, density, and species composition). Major land features such as perennial and intermittent streams, wet areas, stone walls, roads, trails, etc. were also located and mapped.

Forest Structure

The benefits available from a given woodlot depend primarily on its forest structure. This structure is defined by the proportion of forested habitats found within a woodlot. A forested habitat is described by its dominant tree species or forest type, age/size class, and area. This forest structure is dynamic, as the forested habitats age, they evolve through each class, changing the forest structure as well as the benefits derived from the forest.

For example, a forested habitat of antique red oak offers den trees for use by mammals and birds; hard mast (nuts) for squirrels, turkey, and deer; and provides excellent aesthetic opportunities, but little browse and cover. A hardwood forested habitat of seedlings and saplings provides

excellent breeding cover for grouse and excellent browse for deer, but offers little aesthetic appeal.

This plan is not directed toward producing a certain output of timber or wildlife. Rather, the objective is one of producing the conditions most suitable for as many benefits as possible by providing diversity in the forest structure. The goal becomes that of allocating a certain percentage of acreage to each forested habitat that will allow a sustained yield of the desired forested habitats indefinitely into the future. All cutting is directed toward this goal.

The forest structure is controlled with timber removals according to specific silvicultural applications. Timber removals are controlled primarily by the harvest rate (acres per year) and the size of the openings made in the forest

Harvest Rate - Rotation periods are a convenient way to express harvest rates. The rotation period is the approximate maximum age that the forest will be allowed to grow and trees are scheduled for harvesting at this time. Extended rotations (100 years+) will allow development of a wide range of forested habitats and tree sizes.

The harvest rate becomes the number of acres of upland forested habitats in a parcel divided by the desired rotation age. For example, a 100 acre parcel with a 100 year rotation age would have a harvest rate of 1 acre per year. Conducting harvests annually on small woodlots is usually not economical so harvesting is usually scheduled once every 15 years. The harvest rate becomes 15 acres every 15 years.

Size of the Opening - The size of the opening created in the forest canopy of the above 100 acre example parcel can be one large opening of 15 acres or several small openings totaling 15 acres. The intensities of cutting appear as point on a continuum. For example, removing a selected large tree leaves a small opening in the forest canopy and clearcutting leaves a large one; in between the two would be cutting several large trees in a contiguous area, creating a larger

opening than the removal of a single tree but smaller than a clearcut. The distribution and size of these managed openings or patches is problematic and can only be addressed on a case by case basis, with landowner objectives determining each action.

The goal for all of the parcels in this plan is to create openings in the forest canopy which equal the harvest rate using the most appropriate silvicultural systems. The area harvested is then scheduled to flow through all the possible forested habitats, such as a seedling to pole to sawtimber and then be harvested at the predetermined rotation age.

As the necessary silviculture is implemented, the forested habitats that are older than the rotation age will be liquidated and the remaining forested habitats will be brought into balance to ensure an even distribution into the future. Harvesting of some forested habitats may need to be restrained or accelerated in order to bring about this even distribution. In reality, the forest will never reach this distribution, but will oscillate near the desired forest structure. Further, it may take a number of planning periods before the forest approaches the desired structure.

In silviculture, there are 2 main groups of cutting systems; the first is regeneration cuttings and the second is loosely referred to as improvement cuttings and thinnings

Regeneration cuttings change and redistribute forested habitats. These types of cuttings can be made early in the age of a forested habitat or more frequently when the age of a forested habitat is approaching or exceeds the predetermined rotation age.

Improvement cuttings and thinnings enhance and accelerate the growth of a forested habitat into the next larger forested habitat. In some cases, an improvement cutting may create a younger forested habitat. Thinnings will be frequent (every 10-15 years) in the 60-100 year age classes and will be less frequent after age 100. Thinnings provide control of habitat density and structure to promote wildlife, aesthetics, and growth without any desire to regenerate, change, or redistribute the habitat.

The summary of the silvicultural systems to be used to accomplish the desired goals for this planning period can be found in the section **Silvicultural Systems**.

In-Place Enhancements of Forested Habitats

In-place decisions are needed to match a forested habitat with its intended use. These decisions are opportunistic, in that they depend upon the existing state of the forest and the demands for enhancing certain benefits. Such measures, because they are planned by the forest manager on-site, are called in-place enhancements. Site specific directives are difficult to list and locate on a map, but general statements that guide decisions are appropriate for this section of the plan. Some examples are locating thinnings, locating trails and roads, creating openings, and reserving den and/or snag trees. The results of any in-place decisions would become apparent in subsequent inventories. For example, if thinnings in pole habitats speed the transition to sawtimber habitats, this change would be apparent in the inventory

The following are the recommended on-site enhancements which will occur as a result of altering the existing forest structure:

Aesthetics

It is assumed that much of the visual interest in forests is derived from the diversity of forest spaces that are encountered. For activities that require movement, the rate of change and abruptness in change is the key to visual interest. Prolonged exposure to the same forest conditions can lead to boredom; where the change in forest spaces within a woodlot is different, visual interest should be high. Group selection cuttings, shelterwood cuttings, and improvement cuttings encourage horizontal diversity within a forested habitat and tend to favor a patchy distribution of trees.

Maintaining a greater number of forest layers within a timber stand can generate aesthetic as well wildlife benefits. Thinning and selection cutting allow some sunlight to reach the ground and are the primary means of maintaining vertical diversity.

Thinning trees in overstocked forested habitats increases the visual penetration into the habitat and also increases the apparent size of the forest space. Park-like habitats can be encouraged by low thinnings and crown thinnings that do not significantly alter the upper forest canopy. It would follow that by reducing the numbers of small trees and increasing the proportion of large trees would yield greater scenic beauty at the forested habitat level.

A negative factor in the aesthetics of any woodlot under management is the slash generated during the harvesting operations. This is a relatively short-lived effect, especially where the slash is lopped close to the ground (2-3 feet). Under these conditions, hardwood slash should decompose completely in as little as 5-8 years and softwood slash in about 10 years.

Another negative factor is the disorderly appearance of recently regenerated stands, but as these areas age they can provide strong visual contrast to the older stands. This effect can be minimized

to a point, by maintaining a 50-100 foot buffer strip between harvested stands and sensitive areas.

Wildlife

The six essential habitat elements needed which influence use by wildlife are:

1. Browse (buds, twigs, shoots, and leaves of woody plants)
2. Cover (high density of small woody stems - herbaceous vegetation - conifer crowns)
3. Mast Production (fruits and seeds of trees and woody shrubs)
4. Cavity/Den Sites/Snags/Perches (shelter, dens, and nesting sites)
5. Ground vegetation (grasses, woody seedlings <2', and forbs)
6. Dead and Down Trees (woody debris)

In general, seedling and sapling habitats produce abundant herbage, browse, and cover; while older habitats produce more cavity/den sites/snag/perches, mast, and dead and down trees. It is important to note that stands seldom produce high levels of all six habitat elements at the same time. However, a general rule when managing for wildlife is to maintain habitats that have

higher levels of compositional (tree and shrub species) and structural (wildlife elements) diversity, as well as large cavity trees, snags, and dead and down logs and trees. In order to enhance wildlife habitat, the following actions are recommended:

Browse and Cover

Create non-permanent openings (regenerating forested habitats). These areas while they are in the seedling and sapling stage (0-15 year age class) will provide more kinds of food and nest sites than an older stand of trees. Here, animals, such as deer, find the browse they need, especially in the spring and fall and birds, such as ruffed grouse, use these openings for nesting and brood rearing. Where diversity of wildlife is an important objective, it is recommended that patches of 2-5 acres be created for early successional habitat. In general, most properties evaluated do not require these large patches for this planning period. Heavy cutting on adjacent properties has provided plenty of early successional habitat. However, as these cuttings mature, a need may arise to provide this early successional habitat within the Town's property and will need to be addressed during the next planning period (2011). For this planning period, group selection cutting will be the primary method for creating and maintaining non-permanent openings and generally will not exceed 1.0 acre in size. However, the Conservation Commission decided that it would be willing to accept openings of up to 5 acres if early successional habitat was desired.

Seed Production (mast)

Hard mast refers to the nuts produced by trees and shrubs especially oak, and beech. Soft mast are the fleshy fruits such as blueberry and cherry. Acorns are probably the single most important type of food for wildlife in the Amherst forests. Acorns are a staple in the diet of deer, black bear, turkey, grey squirrel, and other wildlife species.

In general, forest-grown trees do not begin to produce seed until the trees are several decades old and individual tree species vary in their seed production potential. Also, trees of the same species usually will not produce seed annually. Because years with good seed production by all species is uncommon, mixtures of species should increase the probability of some seed production every

year. For example, mixtures of red oak and beech should result in seed production nearly every year.

Give special attention to overstory hard mast trees (red oak & beech). By creating ample space around them with crown thinnings, the production of greater quantities of nuts is encouraged. In addition, oaks and beech can provide browse, forage, cavities, dens, perch sites, and feeding substrate. The most common soft mast species are apples and blueberries. Where desirable, it is recommended that desirable soft mast be provided full sunlight by removing and/or killing any overtopping vegetation.

Cavity/Den Trees/Snags/Perches

Cavity trees provide shelter, dens, nest sites, and forage for many wildlife species. Cavity trees are used by a succession of wildlife species. Use of cavity trees range from perches, nest and roost holes, dens, and foraging sites and continues until the tree falls and rots away. Large diameter (18"+ dbh) cavity trees provide breeding, roosting, or denning sites for larger-bodied cavity dwellers such as raccoon, fisher, and pileated woodpecker. Smaller bodied species such as nuthatches, chickadees, and other woodpeckers can use decayed upper portions of larger live stems in addition to smaller diameter (8"+ dbh) stems.

The most important features to look for in identifying potential cavity/den trees are broken off tops and large, broken off branches, the presence of conks or other fungal fruiting bodies, old wounds or scars, dead portions of the tree, and existing woodpecker cavities. Trees that are 8"+ dbh with some of the above characteristics will likely develop into large hollow trees in time. Small and medium sawlog sized trees with external indicators of internal rot are likely to be excavated by woodpeckers and then provide habitat for secondary users in time. If not excavated, they will at least provide foraging, roosting, or perching sites for a variety of wildlife.

Short rotations (<80 years) produce few large diameter cavity trees; whereas, rotations of 100-120 years can be expected to produce some smaller diameter cavity trees and probably would support populations of most cavity dwelling species. Large cavity or den dwelling species

can be supported by allowing for longer rotations or allowing some trees in the shorter rotation scenarios to grow beyond the rotation age to their biological limit.

Snags (standing dead) that do not have cavities are also important. They provide foraging sites and perches for insectivorous birds and raptors, singing perches for many songbirds, and nest sites if near or in wetlands. More wildlife species can be attracted to openings if snags can be left or created within openings or adjacent to wetlands. These snags may be used as nesting cavities for birds, dens for small mammals.

Where possible, leave all wildlife trees during any cutting. Where choices must be made, leave the largest, relatively sound trees, especially those with cavities already present.

Herbaceous vegetation, grasses, woody seedlings, and forbs

There is very little information for use in controlling herbaceous vegetation, so when herbaceous material occurs in situations where it is desirable, the recommendation is to avoid destroying it. Wildlife use of ground vegetation is highest in the early stage of the sapling habitat class. The older habitat classes are used less, usually due to the lack of an herbaceous layer on the ground.

Dead and Down Trees (woody debris)

Woody debris such as logs and slash is important for nesting and shelter, as a source of and place to store food, as lookout sites, for drumming, sunning, and preening sites, and as natural bridges across streams. Decaying logs also are important in nutrient cycling. Logs are considered more valuable for wildlife habitat than other woody debris because they persist longer. The larger the diameter of a log and the longer its length, the greater the value, but small logs are better than none.

Thinning entries will usually be infrequent during the latter part of a long rotation, so there will be some natural mortality providing coarse dead and down material. Additional trees, such as poorly formed, non commercial trees can be killed or treated as needed to provide additional snags and then left to fall and large unmerchantable portions of felled trees should be left in the woods.

Other Considerations

1. Create and maintain permanent grassy and herbaceous openings. The use of skid trails, haul roads, and log landings assures that sufficient permanent openings will be maintained incidental to the primary management effort. Since these areas will be used in successive harvesting operations, maintenance costs are minimal. These openings can be enhanced by seeding grasses and/or planting herbaceous plants. In addition, skid trails and/or hiking trails will be used by wildlife as walking or flight corridors.
2. Maintain dense conifer thermal cover (possible winter deer yarding sites).
3. Protect vernal pools. When harvesting, avoid making ruts deeper than 6" within 200' of a vernal pool. These can present physical barriers to amphibian migration. Tree tops and slash should be kept out of the pool depression and no equipment should be allowed to operate in the depression of a vernal pool. A 50' filter strip around a vernal pool depression should be maintained. No more than 50% of the basal area in a filter strip should be cut at any time during a 10 year period.

Recreation

Roads and trails are the most common form of recreational enhancements; making it easier to walk, ski, or ride through the woodlot. The woods road and trails that presently exist will continue to be useable, if maintained. In addition, the network of skid trails needed to conduct the silvicultural applications could provide further access into the woodlot. However, skid trails usually dead-end and may be too wide initially to provide the aesthetic features of a woodland path. Further study (connect with existing trails) and patience (time to grow back to more natural state) will be necessary to obtain circuitous routes, if desired. Buffer strips may be necessary to protect any visually sensitive areas.

The existing network of hiking trails can be used as skid trails when desirable. However, skid trails are usually wider than hiking trails. If width is a factor, the location and use of hiking trails for skid trails will need to be discussed, in detail, prior to the layout of the harvesting operations.

A negative factor in conducting recreational activities immediately after timber harvests is that newly regenerated areas soon grow into thickets which become very difficult to walk through and will stay in this stage of growth for up to 20 years. To minimize this effect, skid roads can be set back into the woods and located parallel to the edge of newly regenerated areas.

Other site-specific recreational opportunities (i.e. camping, picnic areas, scenic vistas, etc.) will be addressed prior to any on-site work and incorporated into the final operating plan.

Wetlands

All forested wetland habitats have been taken out of those areas regarded as timber producing and are not part of the acreage in determining the harvest rates and rotation age. No cutting is recommended in the forested wetlands and the focus will be to allow these areas to develop naturally and grow to biological maturity. These areas will provide riparian corridors for wildlife movement and an uncut buffer along waterways. In addition, non forested wetlands were located and are shown on the habitat base maps for each parcel.

Harvesting Operations

Conventional harvesting is the most commonly applied technique used when cutting timber and consists of manually felling, with a chain saw, all merchantable trees. The top or unutilized portion of the tree is severed, in place, in the woods and lopped. The merchantable portion of the tree (logs and/or cordwood) is then skidded to the landing using a cable skidder. All products removed from the site are in the form of roundwood and is transported on tri axle log trucks. A considerable amount of slash is left in the woods, but if treated properly (see *Aesthetics*) has a relatively short lived impact.

Biomass harvesting consists of mechanically cutting the standing timber and skidding the entire tree (with its top) to the landing with a grapple skidder. The tree is then cut into pieces according to their highest value product. The logs and cordwood are separated out and the unmerchantable tops and small trees are mechanically chipped and put into trailers for transport to electrical power plants to be used as fuel. One aesthetic benefit of using this type of harvesting is that very little slash is left in the woods. Another is, everything can be chipped - filling the void if no markets for pulpwood and/or cordwood are available.

It is recommended that conventional logging be used whenever possible.

Haul Roads

Three options exist for haul roads which will be necessary for the primary access to the landing area needed to harvest timber from any property. First, where access already exists to a landing, minimal road work other than slight grading and draining may be necessary to initiate a logging operation. Second, a short stretch of new road may be necessary to shield a landing from view of a main road. Such a road, which is usually less than 100' long would require minimal capital to improve access into a woodlot. The third, is where no easy access exists and the most logical location for a landing is in the interior of the property. Considerable expense (stumping, grading, and gravel) may be necessary to build a new road into the interior. This third option is usually employed when the skidding distances are so long as to render any logging uneconomical.

Landings

A landing is necessary to concentrate the forest products at one location to facilitate the loading of forest products on trucks. A good landing location consists of a relatively flat, well drained area, at the end of a haul road or adjacent to a town road. Landings can be hidden somewhat from the direct view of a traveled way by locating the landing a short distance from the town road with a haul road which is at an angle to the road. Landings are usually easily located and built at little expense. However, some may need capital investment (stumping, grading, and gravel) to bring an area up to workable condition. Conventional harvesting (cable skidder) landings are usually much smaller than biomass harvesting landings.

Skid Trails

Old skid trails may exist on the properties and these existing trails can be used again if they connect with, or can be connected to the new landing area. Existing hiking trails can be used if the management objectives will permit their use. If use of hiking trails is prohibited, careful skid road location will be critical in protecting the integrity of the hiking trail.

In most cases, these new and existing trails will be used again and again for successive cuttings. The main skid trails should be as straight as possible, as much of the damage caused by skidding occurs on sharp curves. Avoid unusually long, steep pitches and locate trails as far as possible from streams.

Erosion Control

Deep ground disturbances, such as rubber-tired skidder ruts can be minimized by restricting logging operations to dry or frozen ground.

Water bars and outsloping of roads and landings are the most common means of controlling erosion and are usually installed after logging is completed. During the placement of water bars, ruts in haul roads, skid trails, and landings should be filled if they offer any potential for gullying.

Erosion control measures can be most effective when done in conjunction with seeding of grasses. Areas that may require attention are: disturbed soils in protective strips, landings, and steep pitches on skid trails. In addition to helping control water flow, seeding can also provide food and cover for wildlife.

Water Quality

Water quality can be maintained by keeping the upland soil in place by adhering to Best Management Practices (BMP's).

All erosion control for timber harvesting will be according to *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire; April, 1996; State of New Hampshire*.

All trail construction will be according to *Best Management Practices for Erosion Control During Trail Maintenance and Construction; 1994; State of New Hampshire*.

Endangered Species

No rare or endangered flora or fauna were sighted during the on-site evaluation and no occurrences have been noted by the New Hampshire Natural Heritage Inventory. However, it is possible that some are present. In the future, if such species of flora or fauna are observed to occur on these properties, the New Hampshire Heritage Inventory, Dept. of Resource & Economic Development in Concord, NH should be notified.

Protection

Biotic/Abiotic

Biotic agents such as insects and disease can attack areas of the forest and alter its health as well as species composition. The most common insect affecting the Amherst forests is the gypsy moth which defoliates trees and is more of a nuisance than a potentially devastating insect pest. Usually, the gypsy moth will not kill hardwoods after one infestation. Softwoods, such as hemlock, will die if defoliated once. The effects of gypsy moth defoliation are evident throughout the parcels but should not be a concern. While the control of insect and diseases in a forest situation is usually cost prohibitive, the usual course of action is to try and salvage mortality as it occurs. The salvage operation may slow down an infestation, but will most likely not stop one.

Abiotic agents such as climate change, potential loss of soil and nutrients from fire and catastrophic weather events are hard to predict and manage for. The risk of losses from fire can be alleviated somewhat by providing good vehicular and trail access within a woodlot. The loss of soil and nutrients can be minimized somewhat by using BMP's when constructing trails and conducting harvesting operations.

Boundaries/Trespass

The boundaries of the 6 parcels are not well marked and very little of the boundaries are easily identified (blazed and painted.) Evidence does exist (old blazes, old wire fences, and stone walls) which is adequate to locate the property lines if adequate metes and bounds descriptions are available. Before undertaking any management activities near the boundaries, the Conservation Commission should have the boundaries lines clearly marked to avoid any form of trespass. The cost to locate, blaze, and paint boundaries is roughly \$400-\$500 per mile plus the cost of marking materials. Periodic maintenance (freshen blazes and paint) will be required every 10-15 years.

Revisions

This plan has been prepared to serve as a working document for the period of 1999-2014. By no means is it meant to be "written in stone". One management direction has been presented and should be reviewed, revised, and updated at the end of this planning period, or before so if so warranted.

The particular relationships assumed between the manipulation of habitat classes and the resultant benefits must be regarded as tentative and subject to change if landowner objectives change. As this plan is applied, the assumed relationships should be tested by measuring the production of benefits (landowner satisfaction) and then adjusted to fit a particular area if deemed necessary.

SILVICULTURAL SYSTEMS

Regeneration Cuttings

The time ultimately comes in the life of every forested habitat when it must be reproduced. The continuity of forest habitat production is simply not possible without periodic replacement of forested habitats. Successful regeneration of any sort can occur only if a sufficient amount of growing space becomes available for the establishment and subsequent growth of the new trees. It is easy to ensure that the appropriate vacancies are created in the main canopy by cutting or other means. Such vacancies do not have to be created all at once, but can be enlarged in a series of operations. The ideal objective is to create vacancies that are not merely favorable to the desired species, but are more favorable to the desired species than to any others.

Regeneration cuttings change and redistribute habitats. These types of cuttings can be made early in the age of a forested habitat or more commonly when the age of a forested habitat is approaching or exceeds the predetermined rotation age.

1. Shelterwood Cutting (SW)

These cuttings are directed at the gradual removal of a mature overstory. Securing the desired reproduction before the overstory is removed is the cornerstone of this regeneration method. The overstory is not completely removed until adequate regeneration of the desired species is established. Shelterwood cuttings involve a sequence of treatments and requires conscientious attention to the task of regeneration over a long period of time - possibly up to 20 years.

A first cutting eliminates approximately 30-50% of the overstory. Less vigorous trees and trees of undesirable species are taken; adding light to the forest floor, stimulating seed production from the residual trees, eliminating undesirable seed sources, and creating an environment for seed germination. Once the desired species has started to become established in the understory, the remaining trees are then removed in two or more stages over a period of 10-20 years, with the best quality trees retained at each stage. The timing of subsequent removals is determined by the amount of new reproduction realized by the previous cutting. A 2-cut shelterwood means that the overstory will be completely removed in two cuttings. A 3-cut shelterwood, in three cuttings.

This type of cutting is commonly used to regenerate the shade intolerant tree species such as Red Oak and White Pine, but can be applied to most species. It is not planned to use this system during the present planning period. This system will become more important as management progresses into future planning periods.

A cutting which is similar to a shelterwood cutting is called a deferment or two-age cutting. The residual trees left in a shelterwood cutting are not cut and are left to grow with the regenerated area. This type of cutting leads to a 2 age habitat and may be employed where the total removal of the canopy is not acceptable. This type of cutting is not employed during this planning period but may become important during subsequent planning periods.

2. Selection Cutting (SL)

In theory, the selection method works by removing the oldest trees in a forested habitat as a way to encourage its replacement by new regeneration. Simultaneously, intermediate treatments are applied to the younger trees. The point of the selection method is to maintain vigorous species of at least three age classes (including those in the understory) within the same forested habitat, thereby forming an all-aged or uneven-aged forested habitat in which a few high quality, mature trees and some younger trees are available for harvest at repeated intervals (every 10-20 years). The overstory is never completely removed using this method, but is continually replaced by thrifty trees adjacent to the cut trees or by thrifty trees in the understory. The selection method is best applied in forested habitats of shade tolerant species that have the capacity to respond to release after growing in the shade for extended periods. Such species are sugar maple, beech, and hemlock. This method will be employed in those forested habitats that have a strong hemlock component and, with management, will eventually dominate a forested habitat. The shade intolerant species, such as red oak, white birch, and white pine are unlikely to respond to release and do not regenerate well in the shade and use of the selection method with these species may be disastrous.

3. Group Selection Cutting

When the objective is to promote a mosaic of forested habitats and secure the regeneration of intolerant species, a variation of the selection method can be used and is called a group selection

cutting (**GS**). This type of cutting closely resembles a clear-cut and is different only in its size. Patches are established by removal of a group of trees in a small area (up to 2-5 acres). These holes or gaps are surrounded by desirable, adjacent seed sources. The holes or gaps in the forest canopy are gradually enlarged in subsequent cuttings to provide additional reproduction areas. This type of cutting will gradually create a mosaic of small, even aged forested habitats covering the full range of habitat classes desired. This type of cutting is commonly used when desired regeneration already exists in the understory; in this case, the management decision must be made whether to continue growing the overstory or to start a new forested habitat.

Intermediate Cuttings

After a new forested habitat is established, a long period ensues during which the trees grow and pass through various stages until they are mature and ready to be harvested and replaced by a succeeding generation. The various cuttings made during the development from the seedling stage to maturity without any effort directed at regeneration are termed intermediate cuttings. These cuttings represent the primary means by which the productivity of stands can be increased beyond the best that might be achieved under purely natural conditions. Choosing the kind and number of trees to remain for future growth is emphasized much more than the selection of trees to cut. The primary objective is to improve a forested habitat.

1. Improvement Cutting (IC)

Improvement cuttings are made in forested habitats past the sapling stage for the purpose of improving species composition and quality by removing undesirable species and trees with poor form or condition from the main canopy. The unsatisfactory conditions corrected by improvement cuttings are generally those that might have been avoided if other types of cuttings had been made earlier in the life of a stand. The fundamental characteristic of improvement cuttings is the elimination of poor trees in favor of the good. The stems removed include: inferior species; crooked, leaning, extremely limby, or otherwise badly formed trees; overmature individuals; and trees seriously injured by biotic or other agencies. Generally, dominant trees are removed to favor better trees in the understory. The objective in operations of this kind are to find, encourage, and release desirable trees rather than to merely look for undesirable trees to eliminate. The trees designated for elimination may be harvested in conventional fashion or

merely killed and left standing. This type of cutting can be applied in stands of almost any combination of species and size.

2. Thinning

Thinning is often used loosely to describe an improvement cutting. The purpose of an improvement cutting is to regulate species composition and to improve overall tree quality and vigor by removing undesirable trees. A thinning differs from an improvement cutting in that the main considerations in tree selection are not quality and species composition, but tree spacing for optimum growth. This distinction between thinning and improvement cutting usually becomes blurred in practice, as both cuttings are usually applied simultaneously.

Thinnings enhance and accelerate the growth of a habitat into the next larger habitat. Thinnings will be frequent (every 10-15 years) in the 60-100 year age classes and will be less frequent after age 100. Thinnings provide control of habitat density and structure to promote wildlife, aesthetics, and growth without any desire to regenerate, change, or redistribute the habitat.

a. Low Thinning (LT)

In low thinnings, trees are removed from the lower crown classes. In the lightest of low thinnings, only the overtopped trees would be removed. In low thinning, the natural extermination of the lower crown classes (overtopped trees) is simulated and accelerated. So long as no trees in the main canopy are removed, low thinnings result in little more than the salvage of trees which will eventually die; competition among the remaining trees is alleviated only to the extent that root competition is reduced. The growth of the remaining trees is stimulated only if openings are made in the main canopy. Low thinnings encourage park like forested habitats with little sunlight reaching the ground.

b. Crown Thinning (CT)

In crown thinning, trees are removed from the upper crown classes in order to open up the canopy and favor the development of the most promising trees in the main canopy.

Theoretically, the overtopped trees that do not interfere with the crop trees are not cut in crown thinnings. In practice, there is little reason to leave such trees if they can be harvested profitably

and their continued presence will add value neither to themselves nor to the stand as a whole. Crown thinning normally embodies the best basic principles in the development of good stands for sawtimber, veneer logs, and mast trees. Crown thinnings encourage open, park like forested habitats with dappled sunlight reaching the ground.

