

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE SPECIFICATION GUIDE SHEET**  
**FOREST STAND IMPROVEMENT**

**(ACRE)**

**CODE 666**

This forest stand improvement specification guide sheet encompasses the following purposes:

1. Increasing the quantity and quality of forest products by manipulating stand density and structure.
2. Initiate forest stand regeneration.
3. Reduce wildfire hazard.
4. Restore natural plant communities.
5. Achieve or maintain a desired native understory plant community for special forest products, grazing, and browsing.
6. Improve aesthetic and recreation, values.
7. Alter water yield.
8. Improve wildlife habitat.
9. Increase carbon storage in selected trees
10. Improve forest health reducing the potential of damage from pests and moisture stress.

Specifications are divided into the following categories indicated in italics:

*Competition control for natural regeneration, Precommercial thinning of sapling stands and Crop tree release* are used for purposes 1 – 7 and 9.

*Precommercial thinning of sapling stands for wildlife cover, upland wildlife habitat, and mast tree release* are for purpose 8.

*Sanitation cutting in infected/declining stands* is for purpose 10.

*Removal of Invasive Plant Species* is for purpose 4.

*Stand improvement for carbon storage* is for purpose 8.

This guide sheet also includes specific documentation requirements for practice design, installation and checkout for each category.

All categories require the following design information:

1. Landowner and Design Preparer name and address
2. Property Location, including nearest public road, town and county, and NRCS Field Office
3. Practice name, code, silvicultural justification, amount (acres, trees, or other

<p>Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current standard, contact the Natural Resources Conservation Service. Contact Sally Butler, Forester at 207-990-9557 or email <a href="mailto:sally.butler@me.usda.gov">sally.butler@me.usda.gov</a>.</p>
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units), estimated cost, and time schedule. Estimated cost or project budget should include estimated costs for professional services, materials, equipment, labor, etc.

4. Description of specific work to be performed and its location and size, silvicultural /design specifications, field layout/markings, as well as written instructions for contractor and /or owner.

5. Maps of property and practice locations, including a lat/long for boundary corners and practices.

6. Legal obligations, including property tax status and required permits if needed.

### **COMPETITION CONTROL FOR REGENERATION**

This treatment is intended to control woody or herbaceous vegetation that competes directly with existing, desirable, naturally regenerated or planted seedlings in a forest stand. This would be a forest stand improvement activity to reduce vegetative stocking of undesirable species on a site.

Include sufficient data to show that adequate desirable regeneration is present, and that existing competing vegetation will prevent or substantially delay (>10 years) the successful development of desirable seedlings unless the recommended competition control measures are taken.

Density and species composition before and after treatment must be described in the design.

Identify the vegetation to be removed and provide information to assure effectiveness of the methods used. The vegetation to be removed will typically consist of tree seedlings/sprouts, woody shrubs, or small saplings (<2" dbh) within the understory that compete directly with more desirable seedlings. (If the target vegetation

primarily consists of invasive plant species, consider specifications under Removal of Invasive Plant Species).

The seedlings to be released will typically be well established, 1 foot tall or taller, and of long-lived tree species. Generally, released seedlings after treatment will be present in sufficient numbers to represent a substantial component (one third or more) of the future stand (e.g. at maturity) on all acres treated.

Treatment specifications may consider a range of approaches, e.g.

- To remove vegetation >2" dbh
- To remove non-woody vegetation
- To release seedlings <1 foot tall
- To release desirable regeneration established from sprouts or root suckers
- To release regeneration that will comprise less than one-third of the mature stand.

Competition control may occur through application of herbicides if approved by a Licensed Forester (LF). Refer to Pest Management, Code 595, Standard and Specifications.

Also competition control may occur through the use of mulch mats, weed barriers, tree shelters or similar semi-permanent treatments. Refer to Tree/Shrub Site Preparation, Practice Code 490 and Tree/Shrub Establishment, Practice Code 612, Standard and Specifications.

### **Documentation**

Practice Design, installation and checkout shall include detailed written description, map, and practice layout, modifications and as-builts including:

1. Location of Stands or area(s) where competition control is proposed and actually takes place (Lat. /Long.)

2. Total acreage proposed and actually treated
3. Target vegetation, density/stocking rate pre- and post-treatment
4. Treatment specifications, modifications, and as-builts including method
5. Specifications for the protection of other natural resources including but not limited to water, soil, wildlife, and non-target plants.

### **PRECOMMERCIAL THINNING OF SAPLING STANDS**

This thinning is intended to improve growth, vigor, and composition of sapling stands. (Purposes 1 -7)

The thinning will take place in sapling stands;

- a. composed of 75% or greater by softwood/conifer species; or
- b. other species composition at the discretion of a LF.

Stands are commonly between 5 and 20 years old.

Selection of species to favor should be justified based on stand type, stand structure, and silvicultural guidelines, as well on the form, vigor, and canopy position of individual saplings. Where possible, two or more species should be retained.

Spruce/fir stands should generally favor retention of spruce over fir. Practice Designs should justify the retention of fir over spruce if proposed.

Stands will be composed of saplings, and trees to be spaced will include saplings 1-4 inches dbh.

Trees will be spaced to approximately 6 foot to 8 foot spacing unless otherwise approved by the LF. Spacing in plantations will be approved at the discretion of the LF.

Trees to be removed will be completely severed at ground level (or below the base of the lowest live branches).

Spacing of trees will minimize potential negative impacts to form, such as from white pine weevil, snow/ice damage, or excessive branchiness.

Spacing will occur primarily through the use of chain saws, brush saws, or loppers, or similar hand-operated equipment.

If spacing is proposed via boom-mounted sawheads on tracked or wheeled equipment, or similar machinery, or if chemical methods are used, the practice must be approved in advance by a LF. In such cases occasional corridors for vehicle access which are wider than the proposed spacing may be permissible.

#### Other considerations in:

##### Softwood stands:

Minimum stocking for Spruce-Balsam Fir is 1000 seedlings or saplings per acre or 500 seedlings or saplings of other commercial species per acre. 4/

Begin thinning when trees are 5-10 feet in height.

For adequately stocked and spaced softwood stands overtopped by hardwoods, chemically or mechanically release a minimum of 150- 200 crop trees per acre.

In White Pine plantations and fully stocked natural stands, delay release until trees are a minimum height of 20 feet. Once released, White Pine does not need

thinning until the stand averages 7-8" DBH.

Other species of softwood may be thinned as soon as the crowns have closed.

Minimum stocking for White Pine and Red Pine is 350 well-distributed, vigorous pine seedlings or saplings per acre. 3/

#### Mixed stands:

When thinning a mixed stand, work toward small groups or patches of pure hardwoods or conifers.

On soils with hardwood site indices of 60 or greater, manage as mixed stands favoring groups of pine. Nearly pure stands of pine should be developed where possible on soils with lower hardwood site indices, especially on sandy or gravelly outwash soils or where hardwood site indices are less than 50.

For protection from White Pine Weevil, retain partial shade for individual stems. Remove only those trees which interfere with sunlight to the tops of the pines. Dense pockets of white pine may be completely released. Light crowned species such as birches, aspens and ashes should be favored over the coarser crowned species such as the oaks and maples.

#### Hardwood stands:

If Hardwoods comprise more than half of a stand, consider deferring treatment beyond the sapling stage, or manage as a mixed stand.

Minimum stocking for hardwood stands is 200 well-distributed, vigorous seedlings or saplings per acre with an average spacing of 17 feet between selected future crop trees. Consider delaying treatment until Crop Tree Release is appropriate. 1/ 2/

#### Treatment for ALL stand types

Weed, cut or kill:

a. Trees which may damage desired stems.

b. Trees of inferior species or inferior form, irrespective of species which are outgrowing desirable stems.

c. Coarse stems of sprout origin which are outgrowing stems of seedling origin.

d. Vines and overtopping shrubs which are competing with desirable trees.

Don't overcut. Thin lightly and repeat the process more often.

Do only what is necessary to bring the best trees through the next 5 years.

Thin just enough to bring the upper crowns of valuable stems into full sunlight.

Stands remaining after treatment should be dense enough to assure self-pruning of lower limbs, straightness of stem and protection against snow and ice damage.

#### **Documentation**

Practice Design, installation and checkout shall include detailed written description, map, and layout, modifications and as-builts including:

1. Location of Stands or area(s) where thinning is proposed and actually takes place (Lat. /Long.)
2. Total acreage proposed and actually thinned
3. Stocking rate pre- and post-treatment
4. Treatment specifications, modifications and as-builts including method.
5. Specifications for the protection of other natural resources including but not limited to water, soil, wildlife, and non-target plants.

## CROP TREE RELEASE

The purpose is to improve growth, vigor, and composition of sapling and poletimber stands by increasing the growing space of individual trees with desirable characteristics. (Purposes 1 – 6)

Stands are usually 15 to 30 years old.

This release is to be used in mixedwood, hardwood, and white pine stands, or in plantations, on sites with at least moderate timber production potential.

Crop trees will be of a species, form, and vigor that indicate future potential as sawtimber. Damaged or diseased trees will not be selected.

Crop trees will be 3-11 inches dbh, and at least 20 feet tall, with a live crown ratio >30%.

Crop trees will be released on 3-4 sides of the crown by removal of competing trees. Removal may occur through felling, complete double girdling, or similar treatment.

Removal may occur through application of herbicides if approved by a LF. Refer to Pest Management, Code 595, Standard and Specifications.

If herbicides are used, care must be taken to avoid unintended backflash. (Backflash involves the movement of herbicides through root grafts in some species.) The type, method, and rate of chemical use must be outlined in the Practice Design and completed by a licensed applicator following all label directions.

At least 20 crop trees per acre will be released. The maximum number of crop trees is as follows:

- a. 80 trees per acre in hardwood stands
- b. 120 trees per acre in mixedwood stands

- c. 150 trees per acre in white pine or softwood stands.

In addition, overall stocking of the stand will be maintained so that a well-distributed, well-stocked stand averaging more than 5 inches dbh, with a minimum of 100-400 poletimber trees per acre remains.

The risk of sunscald, epicormic branching, windthrow, and other damaging agents will be minimized by proper tree selection and maintenance of adequate stand stocking.

Crop trees will be clearly and durably marked on the stem at approximately eye-level to identify them for the future (e.g. with a “C” or an encircling band of blue or white long-lasting paint).

Deviate from these guides when necessary to reduce damage to a stand from insects, disease, exposure (sun, wind, ice, and snow), or epicormic branching of hardwoods.

Consider Sanitation as an alternative treatment if the purpose is to address forest health issues. 5/ 6/

### Documentation

Practice Design, installation and checkout shall include detailed written description, map, and practice layout, modifications and as-builts including:

1. Location of Stands or area(s) where release is proposed and actually takes place (Lat. /Long.)
2. Total acreage proposed and actually released
3. Proposed and actual tally showing crop tree count by species.
4. Stocking rate pre- and post-treatment
5. Treatment specifications, modifications and as-builts including type, method and rate.

6. Specifications for the protection of other natural resources including but not limited to water, soil, wildlife, and non-target plants.

**PRECOMMERCIAL THINNING OF SAPLING/POLETIMBER STANDS FOR WILDLIFE COVER AND UPLAND WILDLIFE HABITAT**

This thinning is intended to manage the density, vigor, and composition of sapling stands to promote wildlife cover, especially deer wintering habitat, and other upland wildlife habitat (Purpose 7).

This practice may assist the landowner in meeting or exceeding NRCS quality criteria for fish and wildlife using Maine wildlife habitat evaluation procedures (WHEPs) or other State Office approved habitat assessment procedure.

**Thinning for deer wintering habitat** will take place in sapling stands composed of:

- a. 75% or greater by softwood/conifer species; or
- b. other species composition at the discretion of a LF with consultation from a biologist.

Selection of species to favor should be justified based on stand type, stand structure, and silvicultural guidelines, as well on the form, vigor, and canopy position of individual saplings. The emphasis in this practice is on retaining diverse softwood cover. Wherever possible all or most species present should be represented in the residual stand.

Spruce/fir stands should generally favor retention of spruce over fir. Practice Design should justify the retention of fir over spruce if proposed.

Areas to be thinned will be stands composed of more than 2800 saplings per acre, and trees to be spaced will include

saplings 0.5-3 inches dbh. Trees will be spaced to approximately 6 feet to 8 feet.

Trees to be removed will be completely severed below the base of the lowest live branches.

Spacing of trees will consider potential negative impacts to habitat.

Spacing will occur primarily through the use of chain saws, brush saws, or loppers, or similar hand-operated equipment.

Scattered remnant poletimber may be retained to provide structural diversity.

**Thinning for special upland wildlife habitat** features and continued management.

Practice will be based on subsequent management to protect the identified features/habitat values. All management activities in designated upland habitat areas for the life of the practice will:

- a. promote existing wildlife habitat features
- b. incorporate recommendations/guidelines of the Maine Natural Areas Program and/or the Department of Inland Fisheries and Wildlife to protect rare, threatened, or endangered animals, plants, or natural communities
- c. be based on silvicultural prescriptions developed and implemented by a LF. Biological recommendations in the prescriptions will be based on input from an agency biologist or recognized authority in the biological sciences.
- d. promote or maintain multi-aged forest with a more or less continuous canopy
- e. maintain or create den or nest trees, snags, and coarse woody debris.

f. prevent undue ground disturbance and impacts to soils and localized water resources (springs, seeps, etc.).

g. mark any trees to be removed.

h. exceed regulatory requirements for protection of wildlife habitat or other regulated features.

Individual habitat features will be at least 1/5 acre (r=52.6').

Habitat features under this practice will be identified in the field by long-lasting paint or other method. Areas will be laid out in a manner that will insure adequate protection of identified habitat.

Upland habitat features may include:

a. Clusters of snags, den/nest trees, mast trees, or large/overmature trees that provide valuable wildlife habitat. The trees to be retained will be:

1. Marked by a "W" in durable paint, visible from all sides, or some other long-lasting method.

2. All actively-used den and nest trees will be retained.

3. A minimum of 4 potential/replacement den or nest trees (may include trees with broken tops or large broken-off branches), 10 inches dbh or larger, will be designated per acre.

4. Bald eagle nests or nesting areas should not be marked between February 1<sup>st</sup> and August 31<sup>st</sup>.

b. Softwood inclusions in hardwood stands; hardwood inclusions in softwood stands

c. Unique or unusual stand types

d. Vernal pools or clusters of vernal pools

e. Areas containing rare, threatened, or endangered animals, plants, or natural communities identified by Maine Natural Areas Program and/or the Department of Inland Fisheries and Wildlife

### **Documentation**

Practice Designs will include information on the type of habitat being managed, any other known or identified habitats to be considered, as well as a description of the expected future management of the area.

Practice Design, installation and checkout shall include detailed written description, map, and practice layout, modifications and as-builts including:

1. Location of Stands or area(s) where thinning is proposed and actually takes place (Lat. /Long.)
2. Total acreage proposed and actually thinned
3. Stocking rate pre- and post-treatment
4. Proposed and actual tally of den or nest trees by species.
5. Treatment specifications, modifications and as-builts including method
6. Specifications for the protection of other natural resources including but not limited to water, soil, wildlife, and non-target plants and habitats.

### **MAST TREE RELEASE**

This release is intended to improve wildlife habitat quality by increasing the growing space and vigor of selected mast trees (Purpose 7).

Selection of trees will conform to the following specifications:

a. Species to be released in this practice include smooth-barked beech, oak,

white or yellow birch, wild apple, wild crabapple, mountain ash, serviceberry/shadbush, cherry, ash, chestnut, and butternut. Other species may be included at the discretion of a LF or biologist.

b. All mast trees retained must be 3 inches dbh or larger, well-crowned and vigorous, or clearly capable of becoming so through release from competition. Clearly diseased trees (especially diseased beech) may be included at the discretion of the LF, if it is > 8 inches dbh and is expected to live longer than 5 years.

c. All trees to be removed must be marked with an "M" in durable paint, visible from all sides, or some other long-lasting method.

d. A tally showing mast tree count by species shall be documented.

e. Selected mast trees will be released on 3-4 sides of the crown by removal of competing trees with crowns within 5 feet of the mast tree's crown. Removal may occur through felling, complete double girdling, or similar methods.

f. Removal may occur through application of herbicides, at the discretion of the LF. Refer to Pest Management, Code 595, Standard and Specifications.

If herbicides are used, care must be taken to avoid un-intended backflash.

(Backflash involves the movement of herbicides through root grafts in some species.) The type, method, and rate of chemical use must be outlined in the practice design and completed by a licensed applicator following all label directions.

h. In addition, overall stocking of the stand will be maintained so that a well-distributed, well-stocked stand remains.

i. The risk of sunscald, epicormic branching, windthrow, and other damaging agents will be minimized by proper tree

selection and maintenance of adequate stand stocking.

### **Documentation**

Practice Design, installation and checkout shall include detailed written description, map, and practice layout, modifications and as-builts including:

1. Location of Stands or area(s) where release is proposed and actually takes place (Lat. /Long.)
2. Total acreage proposed and actually released
3. Proposed and actual tally showing mast tree count by species.
4. Stocking rate pre- and post-treatment
5. Treatment specifications, modifications and as-builts including type, method and rate.
6. Specifications for the protection of other natural resources including but not limited to water, soil, wildlife, and non-target plants.

### **SANITATION CUTTING IN INFECTED/DECLINING STANDS**

The purpose of this cutting is to protect, improve, or restore forest health through the detection and control of identified insects and disease conditions in established stands. The practice also is intended as a means of slowing or preventing the spread of identified outbreaks (Purpose 9).

Eligible activities include cutting and removal of infected and declining trees, as well as reduction of host species of identified conditions/agents.

Identified conditions: Forest Health practices should be targeted at reducing stand susceptibility (likelihood of the stand

being attacked) or vulnerability (likelihood of mortality of individual trees) associated with one or more of the following situations:

1. Spruce-fir stands affected by one or more agents including balsam woolly adelgid, spruce bark beetle, dwarf mistletoe, and/or coastal spruce decline
2. Hemlock in softwood or mixedwood stands, susceptible/vulnerable to hemlock woolly adelgid
3. White pine stands in decline or affected by blister rust, drought, and/or other agents specific to white pine
4. Stands in which American beech is a significant component (>20% of basal area), or stands with <20% beech where trees resistant to beech bark disease are present and would benefit from release treatment.
5. Other stands, at the discretion of the LF, with a significant occurrence of insect-infested, cankered, or otherwise diseased stems that could restrict the vigor of the stand or pose a hazard to remaining trees.
6. Consider impacts to wildlife, such as reduction in beech mast, reduction in deer wintering habitat, etc.

Planners implementing these cuttings should ensure their own familiarity with signs, symptoms, and recommended treatment methods for these conditions.

This cutting allows the removal of infected or declining trees to prevent further infection and improve growth and composition of the residual stand. It may also be used to reduce or eliminate host tree species where infection is likely in the near future. Removal of infected material from the site may be included if necessary to prevent re-infection of the residual stand.

This cutting must be based on a current field assessment by a LF.

Trees to be cut/removed may be those that exhibit signs or symptoms of disease, reduced vigor, or are of host species of identified agents that are present in the general vicinity. Other trees in treated stands may be removed or left as necessary to accomplish silvicultural and/or wildlife objectives and/or to achieve appropriate residual stocking.

Trees to be cut/removed will be marked with paint or designated based on specific written prescription.

Cutting/removal rates will be commensurate with the need for sanitation and silvicultural principles. Overall stocking of the stand will be maintained at a level which, as much as possible, uses the site's productive potential.

Rates of cutting/removal of infected/declining/host species trees will fall into one of 3 categories:

- a. Light (0-20 square feet of basal area removed)
- b. Medium (21-40 square feet of basal area removed)
- c. Heavy (>40 square feet of basal area removed)

Cutting/removal may occur through felling, complete double girdling, or similar methods.

Cutting/removal may occur through application of herbicides, at the discretion of the LF. Refer to Pest Management, Code 595, Standard and Specifications. This work shall be completed by a licensed applicator following all label directions.

If herbicides are used, care must be taken to avoid unintended backflash. (Backflash

involves the movement of herbicides through root grafts in some species.)

Additional removal/thinning of trees that occurs concurrently with the sanitation will be according to a silvicultural prescription, and will not be included in the basal area.

### **Documentation**

Practice Design shall include the results of the assessment and recommendations for necessary treatments such as sanitation. The design shall also identify where and if recommended treatments also necessitate application for permits or variances from local, state or federal regulations

The expected composition, stocking, growth and quality of the future or residual stand, and its susceptibility to further insect/disease will be described and regeneration needs will be addressed, if applicable.

Practice Design, installation and checkout shall include detailed written description, map, and practice layout, modifications and as-builts including:

1. Location of Stands or area(s) where cutting is proposed and actually takes place (Lat. /Long.)
2. Total acreage proposed and actually cut
3. Proposed and actual percentage basal area removed or tally of trees removed
4. Stocking rate pre- and post-treatment
5. Treatment specifications, modifications, and as-builts including type, method and rate.
6. Specifications for the protection of other natural resources including but not limited to water, soil, wildlife, and non-target plants.

### **REMOVAL OF INVASIVE PLANT SPECIES**

This removal is to eradicate or control the spread of invasive plant species in forested areas (Purpose 5).

Invasive species eligible for removal include any of the species on the Maine Natural Areas Program list of invasive species in Maine (eFOTG Section I):

This removal is for forested settings and forest edges. It is not for the establishment or maintenance of areas devoted primarily to other uses (e.g. residential, agriculture, recreation areas). See pest management (595) and brush management (314) practices for invasive plant control in other land uses.

Removal must be through mechanical or chemical means, or a combination of the two.

Refer to Pest Management, Code 595, Standard and Specifications when using herbicides and work shall be completed by a licensed applicator following all label directions.

### **Documentation**

The Practice Design must

- a. document the basis for the treatment method being proposed
- b. describe how impacts to non-target vegetation will be minimized
- c. identify the likelihood of re-invasion from other/adjoining areas, as well as means to limit re-invasion.
- d. identify the need for follow-up treatments.

Practice Design, installation and checkout shall include detailed written description,

map, and practice layout, modifications and as-builts including:

1. Location of Stands or area(s) where removal is proposed and actually takes place (Lat. /Long.)
2. Total acreage proposed and actually removed
3. Treatment specifications, modifications and as-builts including type, method and rate
4. Specifications for the protection of other natural resources including but not limited to water, soil, wildlife and non-target plants.

### **STAND IMPROVEMENT FOR CARBON STORAGE**

The purpose is to manage the forest to maximize carbon sequestration by increasing carbon storage in selected trees (Purpose 8).

1. Manage the stand in a long term rotation appropriate for the dominant species. Follow accepted silvicultural guidelines for the forest type. Refer to published stocking guides (for even-aged stands) for appropriate residual stand stocking levels. Use low-impact harvesting methods to minimize damage to the residual stand.
2. Conduct light, relatively frequent intermediate cuttings to avoid stagnation of growth, maintain photosynthetic biomass, and improve residual tree carbon storage.
3. Whenever possible, select tree species and maintain stand composition to favor: fast growing, short lived hardwoods (e.g. aspen, birch), or moderate to fast growing, long lived hardwoods and softwoods, appropriate to the site, that have large biomass at their average age of culmination of mean annual increment

(e.g. red/black spruce, hemlock, white pine, sugar maple, yellow birch, ash, oak).

4. In stratified mixed species stands, remove short lived species at the point of culmination of mean annual increment to release longer lived species (if present as advanced regeneration or a shade-tolerant understory capable of responding to release) so that there is a continuous increase in biomass in the stand.
5. Kill non-vigorous and slow growing trees that will not respond to release and will not continue to add to the net biomass in the stand (primarily where other trees will quickly re-occupy the growing space).
6. When possible, leave the killed trees on site. If utilized, favor end products that provide long-term carbon storage such as furniture or building materials rather than pulpwood.
7. If markets permit, utilize fuelwood/ biomass from thinnings for energy generation as a substitute for non-renewable oil or gas, and to reduce net emissions of carbon.

### **Documentation**

Practice Design, installation and checkout shall include detailed written description, map, and practice layout, modifications and as-builts including:

1. Location of Stands or area(s) where thinning is proposed and actually takes place (Lat. /Long.)
2. Total acreage proposed and actually thinned
3. Stocking rate pre- and post-treatment
4. Carbon stock pre-treatment and projected 10 year carbon stock post-treatment, or net carbon stored.

Describe treatment specifications, modifications and as-builts including low-

impact equipment/material types, method and rates used.

5. Specifications for the protection of other natural resources including but not limited to water, soil, wildlife, and non-target plants.

## REFERENCES CITED

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  - 5/ Leak, William B. 1981. *Do Stocking Guides in the Eastern United States Related to Stand Growth*. Journal of Forestry Vol. 79, 661-664.
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