

Landowner/Producer:		Farm #:
Field/Stands(s):	Acres:	Tract #:
Designed By:		County:
Contact Information:		Date:

DEFINITION: Forest Stand Improvement (FSI) is a forest management technique used to remove unwanted trees from an area in order to improve forest stand composition. In Missouri, young trees readily re-establish themselves following cutting or fire. But tree quality, species composition and individual tree form are often undesirable. Further reduction in quality comes when the better trees are harvested, leaving the lower quality ones. The average unmanaged Missouri woodland produces at less than one-third its potential. The application of FSI thins the forest by killing undesirable or unmerchantable trees. This improves the growing condition for the remaining trees by reducing competition for sunlight, water, and nutrients. The FSI practice can be used to increase the woodland's value for timber products, water quality and quantity, recreation, wildlife habitat, natural beauty, and/or special products.

PURPOSE: (check all that apply)

- Increase quantity and quality of forest products
- Restore natural plant communities
- Enhance aesthetic, recreation and open space values
- Improve water quality
- Increase sequestration of carbon
- Improve water conservation yield
- Improve wildlife habitat
- Reduce wildfire hazard and/or improve forest health
- Initiate forest stand regeneration of desirable species
- Develop renewable energy systems



The red arrow above shows trees that have been double girdled, one of several methods used to remove trees during FSI activities.

SPECIFICATIONS:

Minimize disturbances to the site such as rutting, soil compaction, excessive disturbance to the litter layer, and the addition of fill material.

Facilitate efficient and safe tree removal by controlling the method, felling direction, and timing of tree cutting. Slash, debris and vegetative material left on the site should not present a fire or pest hazard or interfere with the intended purpose. Protect sensitive areas such as vernal pools, riparian zones, and cultural resources.

Kill unwanted trees, shrubs, and vines by any of the following means: **(check all that apply)**

- cutting
- girdling
- basal bark spray
- frilling
- stem injection
- foliar spray on small trees

Even and Un-even Aged Thinning

Base forest stand improvement choices on:

- Relative tree position
- Crown position
- Crown condition
- Tree health
- Stem quality
- Species
- Land user objectives

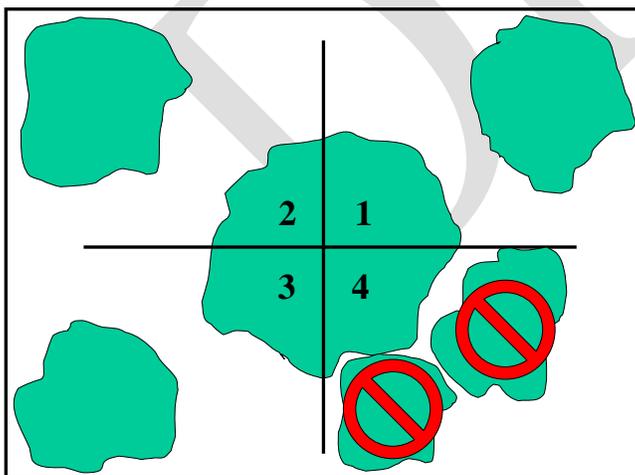
For **even-aged** stands with an average stand diameter less than 6 inches DBH, thin stands to 10-foot spacing. Table 1. illustrates spacing and stocking levels for stands with average diameters of 6 to 12 inches DBH.

For **uneven-aged** stands create or maintain age/size classes which occupy an equal amount of ground space per acre. (i.e. 25% seedling/sapling, 25% pole, 25% small sawtimber, 25% large sawtimber) Each improvement activity should:

- regenerate a new age/size class (if needed)
- harvest mature trees and excess numbers in each age/size class
- maintain or develop appropriate age/diameter class distributions

Table 1. Thinning guide for even-aged residual stocking

Average Stand Diameter (inches)	Spacing (feet)	Basal Area (sq. ft.)	Trees/Acre (no.)
Hardwood			
6	13	55	258
8	16	60	170
10	19	65	121
12	23	70	82
Pine			
6	12	60	304
8	14	75	222
10	16	90	170
12	18	105	134



Remove all trees in direct competition with the crop trees.

Crop Tree Release Thinning

Select 20 to 75 crop trees per acre based on the following criteria:

- Dominant or codominant canopy tree
- Healthy crown
- Minimal epicormic branching
- Good form
- Free of defects and disease
- Desired species
- Adapted species

Remove all trees in direct, adjacent competition with the crop trees. For optimum response, provide at least 10 to 15 feet of crown growing space on all quadrants of residual crop trees.

Additional Specifications (Check all that apply):

- treat **all** stumps with an approved herbicide
- treat **only** the stumps of undesirable species with an approved herbicide
- remove unwanted or undesirable trees down to ____ inch DBH
- maintain maximum stump height of ____ inches for desirable species and ____ inches for undesirable species

Additional Criteria to Provide Wildlife Habitat: Check here if applicable.

- Favor hard-mast producers (oak, hickory, pecan, and walnut) and Shortleaf pine on suitable sites.
- Leave or establish seven snags and seven den trees greater than 6 inches Diameter Breast Height (DBH) per acre.
- Leave four to six native vines per acre. Favor trees with vines that will be left as den trees or oak species greater than 10 inches DBH.
- Consider thinning to 60 percent stocking or less to encourage fuller crown development, increased seed production, and heavier herbaceous plant and woody browse development. Always follow stand specific recommendations listed below.
- Increase forest habitat diversity by installing (Check one or more and see additional job sheets):
 - temporary forest openings
 - permanent forest openings
 - edge feathering
 - downed tree structures



Canopy gaps allow sunlight to reach the forest floor, thus promoting herbaceous plant and woody browse development.



Snags created through FSI enhance wildlife habitats by providing nesting, denning, feeding, and roosting sites.

STAND SPECIFIC RECOMMENDATIONS:

Complete the following table ONLY if a timber harvest is planned in conjunction with FSI (before or after):

Stand #	Current BA/ac	BA/ac to Harvest	Date Planned	Post-Harvest BA/ac

FSI recommendations can be based on basal area (BA) reduction, trees per acre killed, **OR** crop trees per acre to release. Complete the applicable columns below.

Stand #	Acres	Pre-FSI BA/ac	Post-FSI BA/ac	Reduction of BA/ac		Trees/ac Killed		Crop Trees/ac Released	Level of Thinning (see table below)	Date Planned
					OR		OR			

Thinning Level	Reduction of BA/ac	Trees/ac Killed	Crop Trees/ac Released
Light	< 30 sq. ft.	100-199	20-40 trees
Medium	30-40 sq. ft.	200-400	41-60 trees
Heavy	>40 sq. ft.	>400	>60 trees

If chemical application is needed, use the following products at label rates:

Stand	Herbicide	Treatment

When choosing herbicides, review leaching, runoff potential, setback requirements, persistence, and toxicity ratings of chemical formulations. Use the safest available herbicide. Herbicides used improperly can be injurious to man, animals, and plants. Follow all labels.

MAINTENANCE:

- Rotate thinning through each stand to establish various stages of plant succession and age classes
- Monitor treated acres for invasive species and take appropriate action to control/suppress such species
- Monitor treated acres for possible insect and/or disease outbreaks



Always use proper safety equipment when doing forest stand improvement.

SITE SPECIFIC COMMENTS AND RECOMMENDATIONS