BALSAM FIR

Cover Type Guidelines

ROTATION AGES

Rotation age on all sites should not exceed 50 years. It is recommended not to exceed 40 to 45 years in the northeastern part of the state due to the extensive damage caused by spruce budworm.

HARVEST SYSTEMS

Harvest stands by clearcutting in strips or patches. Scattered overstory spruce or fir should not be left standing, because the budworm will survive and build up on these residual trees. If the site is to be regenerated to spruce-fir the young trees will be damaged by the budworm.

Plan the selection of cutting areas and design of timber sales to break up large areas of even aged balsam fir.

Pure stands or stands with a high proportion of mature and overmature balsam fir should be scheduled for harvest first. These stands will experience the greatest loss from the budworm. Mixed stands, especially when mixed with hardwoods and pines will experience less damage and can be held longer before harvesting.

Winter harvest in stands mixed with aspen to encourage the regeneration of aspen, to create an aspen stand, or to create a mixed stand of balsam fir and aspen.

Summer harvest causes more scarification and is recommended when the site is to be converted to other softwood species.

REGENERATION SYSTEMS

Artificial regeneration is not recommended.

Natural regeneration to create pure balsam fir stands is not recommended in northeastern Minnesota.

Natural regeneration of mixed stands relies on advance balsam fir reproduction present at the time of harvesting, or seeding from surrounding uncut balsam fir stands, and suckering or seeding of other tree species from surrounding stands.

TYPE CONVERSION

Sites with a minimum of 20 square feet of evenly distributed aspen per acre can be converted

to aspen through winter harvesting.

Conversion to spruce or pine by artificial regeneration should be considered where aspen and paper birch site indices are less than 60. Planting black spruce on balsam fir sites is an option for northeastern Minnesota, but root and butt rots can be a problem for black spruce after age 60 on upland sites.

CULTURAL PRACTICES

Release of young balsam fir from competing hardwoods is not recommended. The goal in most management of balsam fir is to increase the proportion of other species in the stand.

Thinning of mixed balsam fir-white spruce stands is not recommended but can be used to reduce the proportion of balsam fir in the stand.

PEST CONSIDERATIONS

The spruce budworm and various decays commonly attack, injure and kill all age classes of spruce-fir. The spruce budworm, *Choristoneura fumiferana* is the most destructive insect in Minnesota forests, causing the greatest volume loss. The budworm prefers balsam fir but can also be a problem on white spruce. Decays also cause a large volume loss. Root and butt rots caused by *Armillaria spp*. and/or *Inonotus tomentosus* are present in most stands of spruce-fir older than 30 years. *Stereum sanguinolentum*, a heart rot, enters the trees through broken tops, branches, and other injuries and causes the majority of the rot found in living fir trees.

Specific management recommendations:

1. Manage the spruce-fir on a rotation of approximately 40-45 years, since mature and over-mature trees suffer the most severe damage.

2. Prevent stands from reaching maturity simultaneously over large areas by improving the distribution of age classes through planned cuttings such as patch and strip clearcuts.

3. Harvest spruce-fir by clearcutting. Fell all white spruce and balsam fir when harvesting stands where the next crop will be provided by balsam fir advanced regeneration. The residual trees may act as sources of budworm infestation to the regeneration.

4. Avoid regenerating spruce-fir on coarse, acidic, or shallow soils as these sites favor the development of root and butt rots. Root and butt rots increase tree mortality when these stands are defoliated by spruce budworm.

5. Maintain or promote mixed species composition by encouraging white spruce and hardwoods and discouraging balsam fir to decrease the component of fir in the stands. Highest risk stands are pure balsam fir. White spruce suffers much less damage from budworm.

6. Break up susceptible spruce-fir types into small areas separated by other species.

If the budworm population becomes epidemic, the following steps should be taken:

1. Identify mature, over-mature, and high volume stands; accelerate cutting on such stands.

2. Plant to salvage spruce-fir stands expected to suffer heavy losses.

3. Aerial spraying may be necessary to prevent heavy losses in valuable stands. Chemical control is aimed at foliage protection to keep trees alive rather than budworm control. A second buildup of budworm usually occurs after spraying and may actually prolong the duration of budworm outbreaks.

Trunk, root and butt rots - These diseases are important pest problems on balsam fir. Reduce the severity and incidence of rots by avoiding wounding. Severe spruce budworm defoliations from logging, wind, ice, etc. are the major source of wounds leading to decay.

Problems are more likely to occur with the following soil conditions:

- Coarse textured, acidic soils
- Soils with shallow root zones due to high water tables and fragipans.

WILDLIFE CONSIDERATIONS

Balsam fir is rated good to very good for wildlife. It provides excellent winter and summer cover for deer and moose. Manage stand rims and patches of balsam fir primarily for wildlife cover and travelways. Balsam fir provides good to very good nesting and perching sites for birds. It provides escape cover and insect and seed foods for birds.

PREFERRED SITE CONDITIONS

Balsam fir is very adaptable and grows on a variety of sites. It has a moderate moisture and nutrient demand. This species grows well on somewhat poorly to well drained sandy loams to clay loams with at least 18 inches of free rooting zone. Best growth occurs on moist loamy soils. Balsam fir frequently occurs on sandy sites as understory to pine and aspen. With the possible exception of somewhat poorly drained sands, these sites typically do not produce well and may be better managed for other species.