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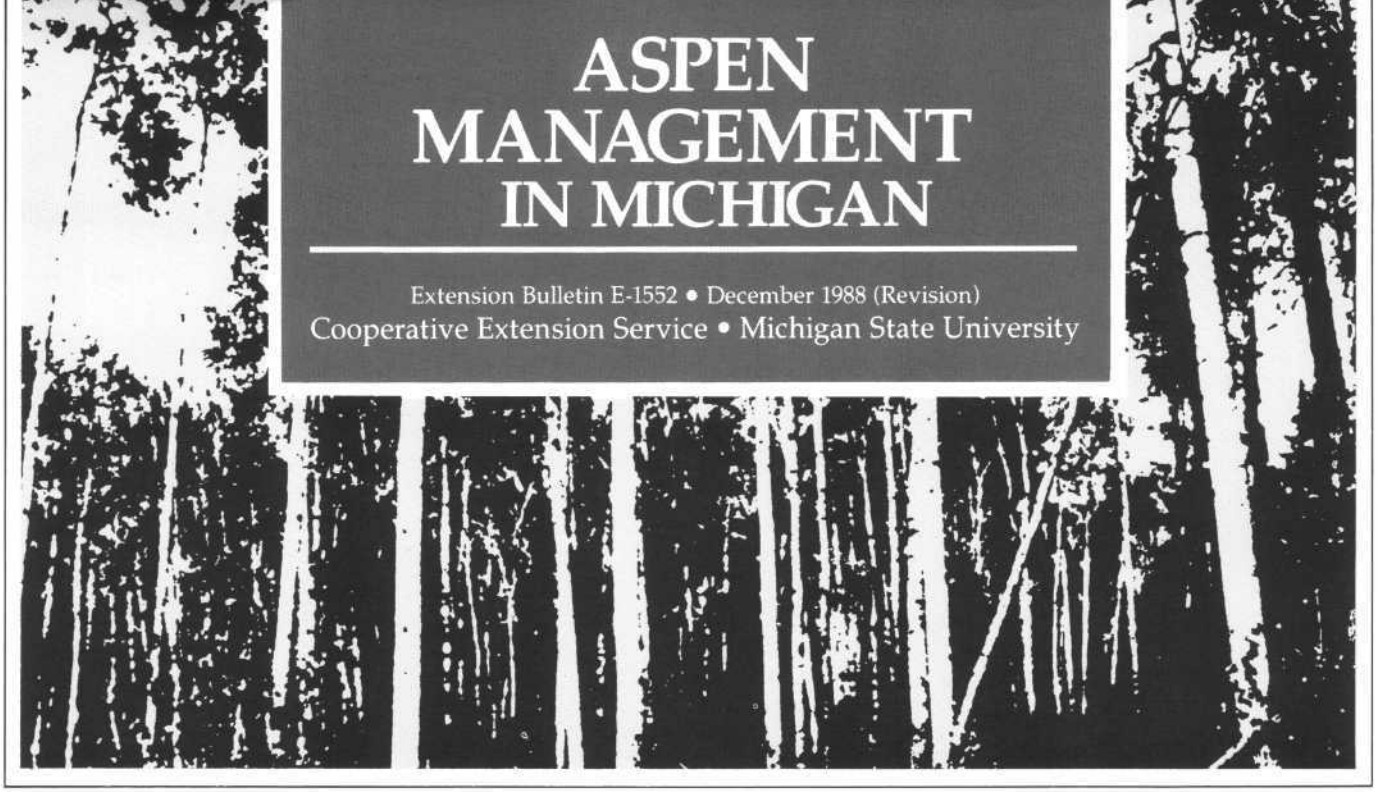

ASPEN MANAGEMENT IN MICHIGAN

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Aspen or "popple" forest stands are widely distributed throughout Michigan, particularly in the northern lower peninsula and throughout the upper peninsula. According to 1987 U.S. Forest Service data, the aspen forest type occupies over 3.4 million acres—about 20 percent of Michigan's commercial[1] forestland. More than half of this acreage is small, nonindustrial, privately-owned land.

In 1986, approximately 1 million standard cords of aspen were harvested in Michigan valued at over $6 million.[2] Since the state's total aspen resource is estimated to be over 40 million cords of growing stock, this valuable forest resource is worthy of intensified management and use.

Aspen forests are valued not only commercially for manufacture into pulp, paper products and structural panel products, but also environmentally as a source of food and shelter for many forms of wildlife, such as deer and ruffed grouse (partridge). Like other forest types, aspen positively affects water quality and provides settings for outdoor recreation and tourism.

THE ASPEN FOREST TYPE

Aspen is a prolific, fast growing, short-lived tree with numerous olive-green to whitish stems that grow close together. In fall, its foliage is a brilliant golden-yellow. Aspen adapts to a variety of soils and sites. Accordingly, growth varies depending on soil fertility and moisture.

[1]Michigan's forestland includes timberland, containing or capable of producing commercially important trees and now withdrawn from timber utilization—95.2 percent of forestland, woodland incapable of producing commercially important trees because of poor site conditions—1.4 percent, and forestland reserved for uses that preclude commercial timber harvest—3.4 percent.

[2]Assuming a stumpage value of $6 per standard cord.

Because it is shade intolerant—i.e., unable to establish and grow properly in shade—aspen occurs in even-aged stands (groups of trees that are the same age) where no other tree species dominates. It often establishes after a catastrophic event, such as fire, or after cutting of a previous stand containing some aspen. Aspen will grow vigorously in mixed, even-aged stands providing that it is initially established with the other species regenerating on a site.

On good sites, aspen is ready for harvest for whole-tree chip material in 30 to 35 years, or for pulpwood and sawlogs in 40 to 45 years. However, actual harvest age is determined more by the management objectives, financial factors—such as return on investment, or wildlife habitat concerns than by biological maturity.

Because aspen occupies ground for only 40 to 60 years it

is considered a temporary forest type. However, it will usually give way to more shade-tolerant tree species. Succeeding species will vary depending on the site. On heavier soils in northern lower Michigan, hardwood species, such as sugar maple, American basswood, yellow birch and American beech, will usually develop. In the upper peninsula, white spruce and balsam fir often succeed aspen stands. Aspen harvesting methods can delay or accelerate natural conversion to other species.

Aspen Varieties and Stand Components

Three species of aspen are present in Michigan (fig. 1). Conditions such as climate, soil, slope, etc., determine what species will grow on a particular site. Quaking aspen *(Populus tremuloides)* is the most abundant because it adapts as well to dry, coarse-textured sandy soils as it does to wet heavy clay soils.

Big-tooth aspen *(Populus grandidentata)* is also fairly abundant in Michigan. However, stands are usually restricted to better sites that are neither extremely dry or wet. Balsam poplar or Balm-of-Gilead *(Populus balsamifera)* is found only on low, wet sites along streambanks or on the edges of lakes and swamps. It is the least abundant of the three aspen species in Michigan.

Aspen usually grows in pure stands—trees of the same species—although it does infrequently occur in mixed stands. Complementary species include paper (white) birch, pin cherry and red maple. In northern areas, balsam fir and white spruce are common understory species with aspen. Other species may also be found, depending on stand history and site quality.

Site Quality

Aspen site quality varies with soil texture and depth to the water table. The best sites are loam or clay loam soils with high water holding capacities. Optimum water table depth is 4 to 6 feet. Sites with water tables considerably below 6 feet or above 4 feet will be less productive.

The potential to produce forest crops is related to site quality and is often expressed in terms of expected average tree height (in feet) of the dominant trees on a specific site when they are 50 years of age. This is termed site index. Timber production is best where site index is 65 or greater. Moderate production can be expected with site indexes of 55 to 65, while an index of less than 55 indicates a low or poor quality site. (Caution: Early height growth is not a reliable indicator of site quality and should not be used to evaluate productivity in stands younger than 20 years of age.)

Growth and Yield

Aspen will produce substantial yields of timber on good sites. At 50 years of age, expect 20 to 25 cords per acre on medium sites and 30 cords or more per acre on good sites. This is comparable to approximately 5 "pulpwood sticks" or more per tree (See "Units of Measure" section).

On infertile or otherwise unsuitable sites (site index less than 55), growth and yields will be poor. Serious defects usually develop in a large number of trees at an early age, which will make many trees unmerchantable (unsalable).

Units of Measure

Most often, aspen grown for pulpwood is sold in full cord (4 feet by 4 feet by 8 feet) or pulpwood cord units. In Michigan, a pulpwood cord is a stack of wood 4 feet wide by 4 feet high by 100 inches long. Pulpwood is cut into 100-inch "pulpwood sticks" to take advantage of truck width for transporting. In some locations, however, pulpwood is sold on a weight basis—i.e., the number of tons in a truckload. A standard cord of green aspen weighs approximately 2.3 tons.

Whole tree chipping of aspen and other forest types has increased in Michigan since the late 1970s. Higher total yield of wood per acre is possible with whole tree chipping because limbs and tops that were previously left as waste by conventional harvesting methods are used. Chips are sold by weight, generally on a green ton basis.

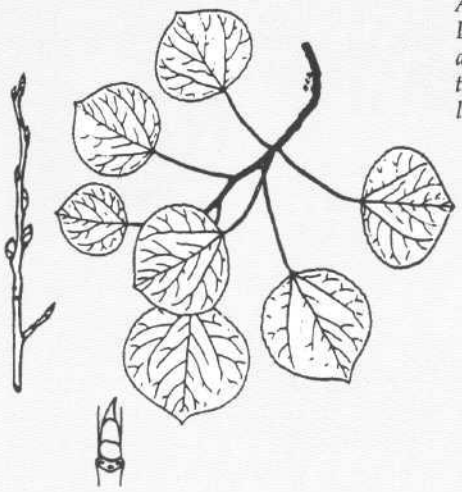
MANAGEMENT CONSIDERATIONS

The principal objective of any sound forest management program is to maximize present profits by harvesting mature crops, while ensuring future profits by providing for regeneration or re-establishment of new forest stands. Many factors affect management decisions, including the biological and ecological characteristics of the forest stand, stand health, site quality, availability of markets—which affects the intensity and timing of harvest operations, harvesting methods, etc.

Biological and Ecological Characteristics

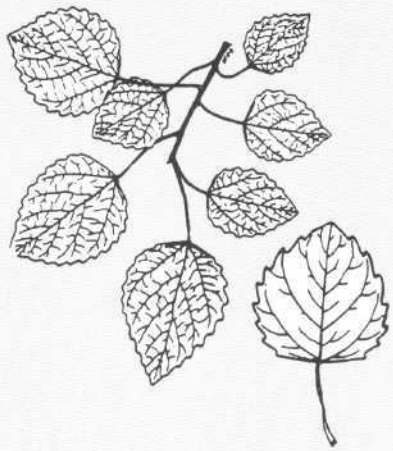
Reproduction-Stocking Characteristics: Aspen is unique because stands reproduce easily by root suckers (sprouts). When stems are harvested, the root systems respond by producing many suckers—from 3,500 to more than 22,000 per acre within one year of logging. By the second year, however, most

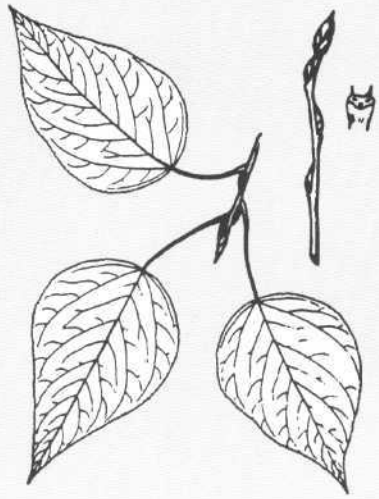
Figure 1. Leaf diagrams of the three aspen species present in Michigan. Big-tooth and trembling aspen are of much greater economic importance than is balsam poplar.



TREMBLING ASPEN *(Populus tremuloides).* *Commonly called "popple" or "poplar." Leaves are round and "quake" in the slightest breeze. Tree enjoyed by deer and beaver. Excellent pulpwood tree.*

BIG-TOOTH ASPEN *(Populus grandidentata).* *Similar to trembling Aspen, except leaf has large, coarse margin. Leaf stem, also flat which causes quaking in a breeze. Tree bark is more yellowish in color than trembling Aspen. Best of the aspens for lumber and pulpwood.*





BALSAM POPLAR *(Populus balsamifera).* *Balm of Gilead, tacamahac, are other common names of balsam poplar. Leaf is 3 to 6 inches long. Buds are brown and very resinous and fragrant.*

suckering is complete. New stands will contain between 4,000 and 6,000 stems per acre—more than enough to successfully establish a new stand.

Production and development of aspen suckers are affected by the number of trees left after logging or fire and the time of year that logging occurs. Because of the intolerant nature of the species, aspen suckers usually develop best in full sunlight. In mixed stands, relatively few aspens will produce a full stocking of suckers.

If more than a few cull or otherwise unmerchantable aspen trees remain following harvest, remove them. Also eliminate poor quality or undesirable trees of other species. Where wildlife objectives are also important, leave no more than three to four active den trees per acre. Remove any trees that will prevent aspen from adequately regenerating.

Thinning

Thinning, or removing selected trees, is done to reduce tree density (number of stems per acre) or to eliminate poor quality and diseased trees so that subsequent growth is concentrated on fewer trees of higher quality. In Michigan, thinning is not recommended for aspen stands being managed for pulpwood production because prevailing market conditions and site quality make thinning economically infeasible.

Harvesting

Harvesting Method: Because aspen is shade intolerant, clearcut harvesting is recommended to ensure optimum root sucker production and rapid stand regeneration. Clearcut harvest removes all trees in an area at one time, regardless of size. Sophisticated machinery, such as tree shears, feller-bunchers and whole-tree portable chippers, is available to harvest aspen. Because mechanical harvesting is a high volume per acre operation in well-stocked, even-aged, mature aspen stands, it is an economical alternative to traditional logging methods. Mechanized harvest increases labor productivity and favors year-around logging operation, conditions permitting.

Although machine harvesters cause varying degrees of site disturbance, few adverse effects on soils and watersheds have been observed. However, machine harvesting does create favorable regeneration conditions and desirable wildlife habitat. Slash can be concentrated where desired, brush can be uprooted and largely destroyed, and unmerchantable trees can

be felled or broken off at low cost.

Whether harvest is manual or machine, clearcutting is visually disturbing if the area harvested is too large. In the short-term, clearcutting will cause unsightliness, erosion and have negative effect on water quality. Although the initial results of clearcutting may negatively affect recreation, streamflow and water quality, they are only temporary.

To minimize the undesirable effects of clearcutting, harvest areas from 25 to 40 acres in irregular, free-form shapes that follow natural or manmade landscapes. Avoid unnatural cutting boundaries with long, straight edges or rectangular shapes, which clash with the natural landscape and surrounding timber. Where edges contrast sharply, soften the effects by "feathering"—thinning into adjacent stands to produce an irregular, loose appearance or spacing. Leave buffer strips along streams and major highways.

Harvest Timing: Time of year when harvest occurs influences the amount of root suckering. Harvest during the fall and winter to encourage maximum production of vigorous suckers, which appear the following spring. Sprouts often grow 5 feet or more the first year, and usually outgrow other woody species or herbaceous growth. Harvesting in late spring and early summer may result in fewer suckers than fall or winter harvest, although in most cases, enough suckers sprout to successfully reproduce the stand.

Wildlife

Producing aspen timber stands and maintaining wildlife habitat are fully compatible objectives. Clearcutting creates highly desirable habitat for deer and grouse. Harvesting several small, well-dispersed areas each year will produce vigorous aspen stands at varying stages of maturity. Furthermore, harvest ages should be shortened to foster favorable wildlife conditions. Stands of varying ages are especially desirable for grouse because they satisfy its habitat requirements. Also, deer and elk browse sprout stands throughout the year.

In some areas of Michigan, overmature aspen stands, combined with high populations of deer and/or elk, can affect stand regeneration after harvest. Overmature stands (55 years old or older) generally do not produce enough sprouts. Deer and elk can seriously overbrowse the few sprouts that are produced. When managed carefully, however, these problems can be avoided.

Pests

Aspen is vulnerable to attack by a variety of insect and diseases pests. Occasionally, insect pests such as the forest tent caterpillar, large aspen tortrix and gypsy moth can cause serious damage to aspen stands. However, control of these outbreaks is often not economically justified. Hypoxylon canker and heart rot are destructive diseases that cause considerable economic loss to aspen stands each year. Although no direct controls are known for either disease, management to promote healthy stands will help minimize their spread. Maintain well-stocked aspen stands and harvest promptly at maturity.

FOR MORE INFORMATION

For more information on aspen management, see the following publications available from the North Central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, MN 55108:

Manager's Handbook for Aspen in the North Central States, North Central Forest Experiment Station General Report NC-36, USDA Forest Service, 1977.

Quaking Aspen: Silvics and Management in the Lake States, Agriculture handbook No. 486, USDA Forest Service, December 1975.

Many Extension publications are available on forestry and forestry management. Call, write or visit the Cooperative Extension Service Office in your county for more information. Following is a list of related publications available there or by writing to the MSU Bulletin Office, P.O. Box 6640, East Lansing, MI 48826-6640:

E-0616, *Familiar Trees of Michigan* ($.40)

E-0722 *Guidelines for Improving Northern Hardwood Timber* (free)

E-0771 *Tree Planting in Michigan* (being revised)

E-1486 *Woodlot Management for Fuelwood* (free)

E-1492 *Why Manage Your Woodlot?* (free)

E-1572 *Establishing Fuelwood Plantations in Michigan* ($.35)

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