



# LAKE STATES WOODLANDS

## Aspen Management



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A woodland, or a stand of trees within a woodland, in which most of the trees are aspen is called an aspen woods or an aspen stand. This publication will be of interest primarily to owners of aspen woods and stands, but the information presented will also make a visit to an aspen woods or stand more enjoyable for others.

Covering nearly 12 million acres, aspens are the most widely distributed forest trees in the Lake States (Wisconsin, Michigan and Minnesota) (Figure 1); they occupy 34 percent of the commercial forest area.

In the early 1800s, the the original upland forests of the Lake States were commonly described as extensive pure stands of pine. The forests were frequently called the "pineries," and descriptions of magnificent pine stands are readily available in historical accounts of the time. However, records also indicate there were large areas that could be classified as aspen-birch-conifer and aspen-birch-hardwoods. In 1899, aspen volume in Minnesota was estimated to be greater than the combined volumes of red and white pine. There is

also evidence from Wisconsin and Michigan that aspen was present in varying amounts mixed with pine, spruce-fir, and northern hardwood types. In other words, when pine logging began, aspen was already a part of several forest types over much of the Lake States.

The area of aspen has greatly increased since the time of early settlement. Pine logging and subsequent fires left large areas of denuded lands, many of which were invaded by aspen. Aspen invaded some of these areas by means of wind-dispersed seeds. But more importantly, many stands developed into aspen because fire-killed aspens sprouted vigorously from the roots. As a result, aspen has become the dominant forest cover type in the Lake States.

### Aspen Characteristics

The aspen forest type includes primarily two species: *Populus tremuloides* and *Populus grandidentata*. *Populus tremuloides* is known commonly as quaking

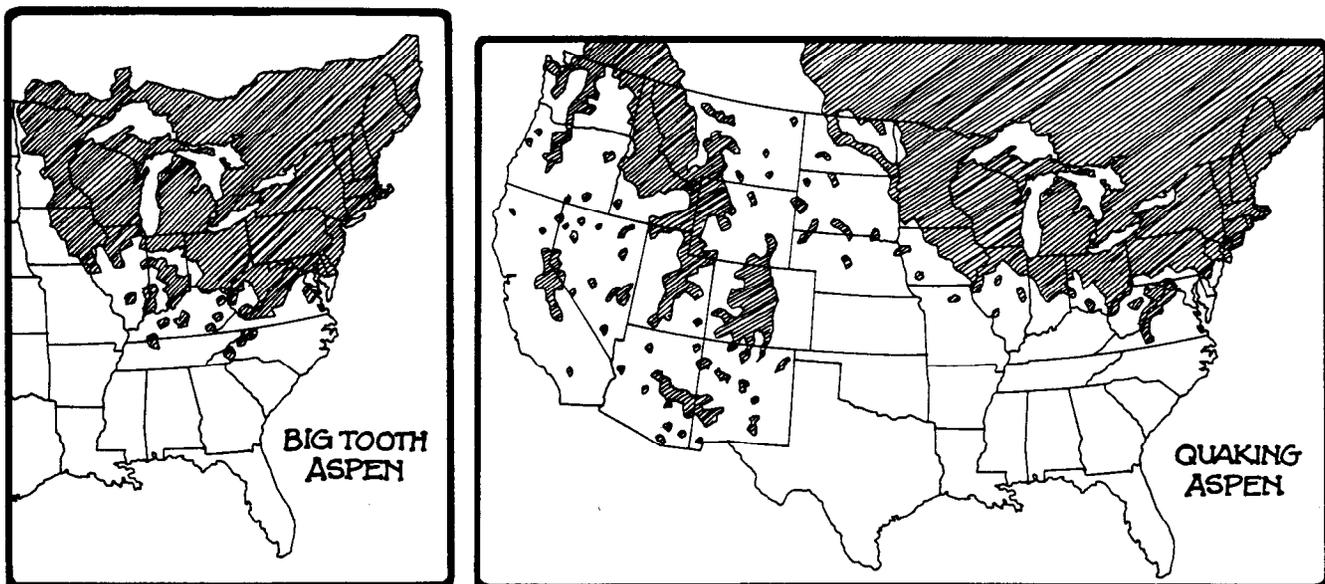


Figure 1. Distribution of bigtooth and quaking aspen in the U.S.

aspen, trembling aspen or popple. *Populus grandidentata* is commonly called bigtooth aspen, large-tooth aspen, or yellow popple. The major differences in appearance between the two species are leaf margins and bark color and texture. The leaf edges of bigtooth aspen are coarsely toothed while those of quaking aspen are finely toothed (Figure 2). The bark of quaking aspen varies in color from greenish-white to cream-colored to nearly white. The bark of bigtooth aspen is usually darker with more of a greenish-yellowish tint.

Quaking aspen is more abundant over the range of aspen, which means it grows on a wider variety of soils. Bigtooth aspen is usually restricted to better sites. Bigtooth aspen seems to attain greater size and age before deteriorating.

Aspens are relatively fast-growing, short-lived trees. On good sites they usually reach maximum development at about age 50-60 years, and on poor sites at 30-50 years. Stands older than this will continue to grow, but rot increases rapidly, destroying their value for wood production. As the trees become overmature, stands tend to deteriorate rapidly from decay.

Aspens are considered "pioneer" species because of their ability to invade cleared or abandoned areas. However, because they will not grow in shade, they will occupy an area only until more shade-tolerant species take over—or until fires, windstorms, or complete clearcutting clears the area again. Repeated crops of aspen can be grown on an area successfully only if all trees are removed when a crop is harvested.

On most sites aspens do not grow to sawlog size, so aspen wood is used mainly for pulp. But on good sites, large trees can be harvested as sawlogs, which can be processed into lumber, pallets, boxes, crating, pulpwood, particleboard, excelsior, matches, turned articles, and veneer for paneling, berry boxes, etc.

## Reproducing Aspen

Although they produce abundant seeds, both quaking and bigtooth aspen seldom reproduce from seed except under the most favorable conditions (the seed of both species remains viable for only 3-4 days). Instead, aspens usually regenerate by means of abundant root sprouts or "suckers" that develop after aspens of any age have been cut. When few or no other species are growing beneath mature aspen, young aspen suckers develop in large numbers following cutting. This growth can usually be depended upon to establish a new stand.

In general, the number of suckers produced is proportional to the degree of cutting. More suckers develop—and grow best—in full sunlight. For this reason, clearcutting is used to harvest and reproduce aspen.

Preferably, all trees greater than 2 inches in diameter should be cut. Leaving even a few trees in the overstory can seriously reduce sucker growth. In

some cases, the understory (brush and small trees) may also need to be controlled. A prescribed burn can help provide favorable conditions for aspen sucker development.

Time of logging also influences suckering. Logging in winter and fall results in more and more vigorous sprouts than logging in summer and spring does. But for all practical purposes, stands can be harvested in any season if a complete clearcut is achieved. Complete clearcutting usually assures enough sprouts to develop a new stand. Sprouting is least vigorous during June and July, but excessive understory can be reduced by harvesting the overstory during the summer.

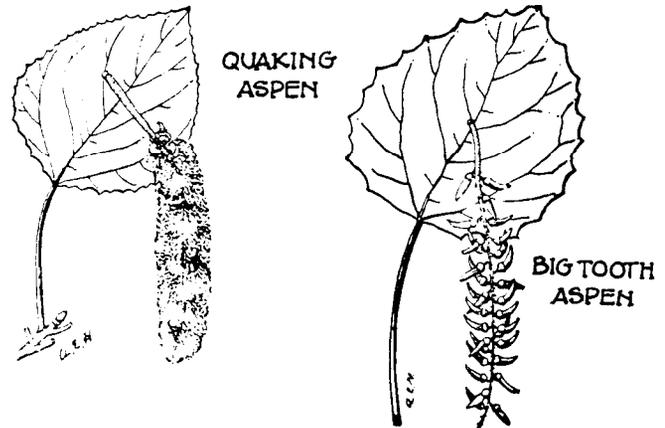


Figure 2. Leaves and fruit of quaking and bigtooth aspen.



Figure 3. One-year-old quaking aspen root sprouts (suckers).

## Management Alternatives

In many respects, aspen is an ideal multipurpose tree. It can be managed at low cost to produce salable timber products while providing highly desirable wildlife habitat and soil cover. Dependable regeneration from root suckers, early natural thinning and pruning, and fairly rapid volume growth over a short rotation make it possible to grow crops of aspen without thinning. For most stands, the only investments are clearly prepared harvesting instructions that specify cutting of all trees larger than 2 inches in diameter and reduction of excessive understory, if necessary, by shearing or a prescribed burn.

The recommended management system for growing and reproducing aspen is complete clearcutting at rotation age to regenerate fully stocked stands of suckers. To minimize losses from insects and diseases, aspen should be harvested promptly at maturity. One problem is that maturity differs with different sites. A determination of site quality should be made before a management program is started. Site quality determination is a most important first step in managing an aspen stand and can best be done by a forester.

It is not always easy to determine aspen site quality, especially when stands are young. One classification foresters use is "site index" which, simply stated, is the average height of the trees in the stand at age 50 years (Figure 4). A site index of 60, for example, means the trees are 60 feet tall at 50 years of age. The best sites are those having a site index of 70 and above. A site index of 55–70 is average and an index of less than 55 is considered poor.

### Poor Sites

On poor sites, growth and volume yield of aspen are usually poor, and little can be done to increase the low yields. Stands that reach merchantable size should be harvested before they deteriorate and become unmerchantable. Recommended rotations range from about 30–35 years. On the poorest sites, serious defects develop at such an early age that trees do not even attain salable size. In those cases, consideration should be given to converting aspen to pine or another species by planting or other means.

### Medium and Good Sites

Aspen on medium-quality sites generally grow to cordwood size (6–10 inches in diameter) at maturity and

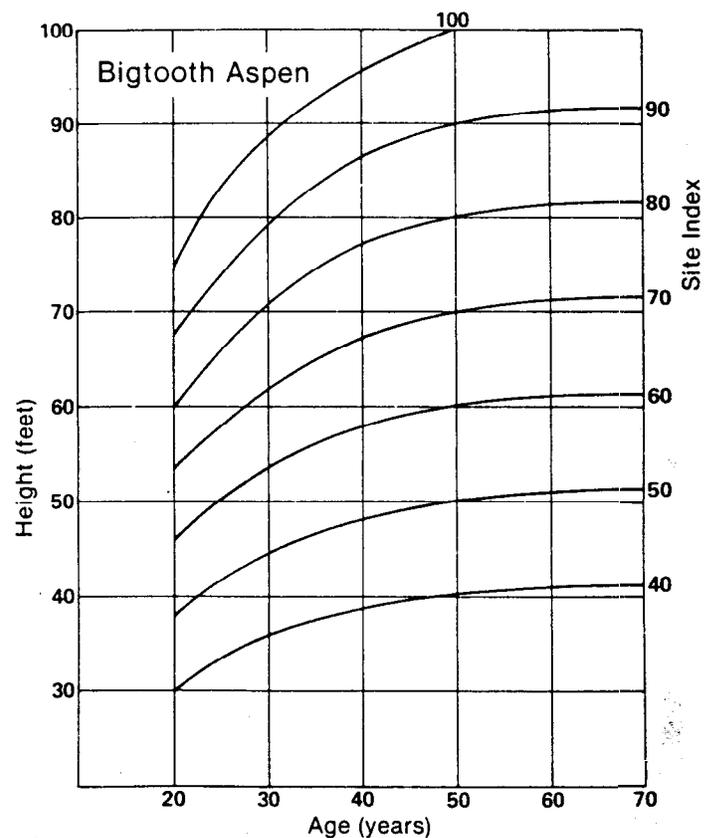
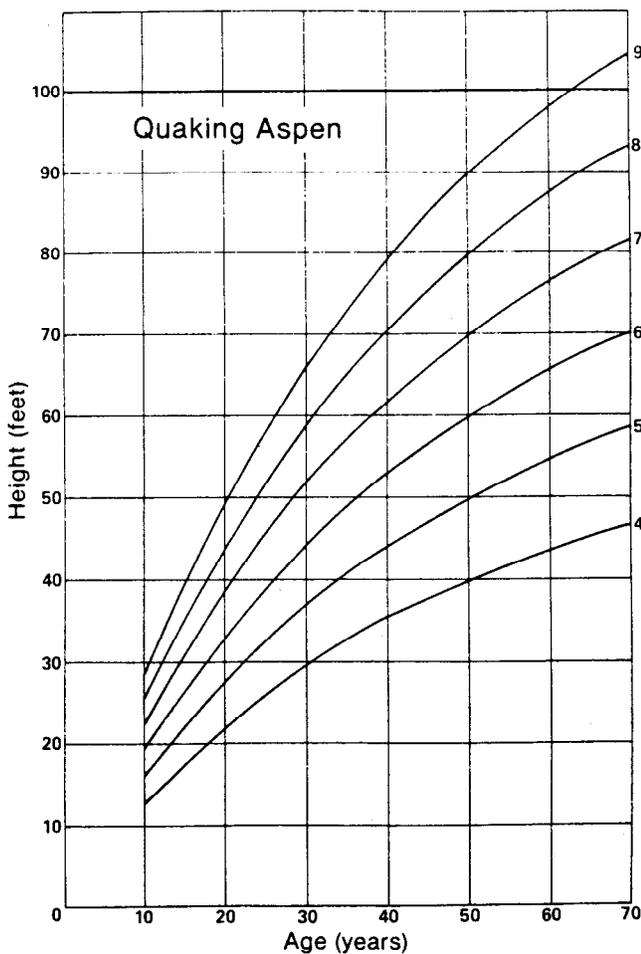


Figure 4. Site index curves of the two aspens.

produce yields of 20–25 cords per acre. These stands should be harvested between 40 and 50 years of age, when they are producing maximum annual growth.

Aspen on good-quality sites produces yields of 30 or more cords per acre. Stands on good sites should be harvested between 50 and 60 years of age, when producing maximum annual growth. In actual practice, stands may be harvested at younger or older ages to take advantage of favorable markets. But harvest should not be delayed more than 10 or 15 years beyond the age ranges given because overmature stands of aspen can deteriorate rapidly. In scheduling harvests, higher quality sites should be harvested first; those with lower site indexes, later.

## Harvesting and Esthetics

The shapes and sizes of areas to be harvested in an aspen stand depend upon the owner's wishes; age, size, and stocking of the stand; and economics of selling and logging. If the market is strong and an owner has 20 acres or more of well-stocked maturing aspen on a good site, he could, if he wished, break up his large-monotype of even-aged trees by cutting portions of the stand early and holding other portions past rotation age to provide a better future age distribution (Figure 5).

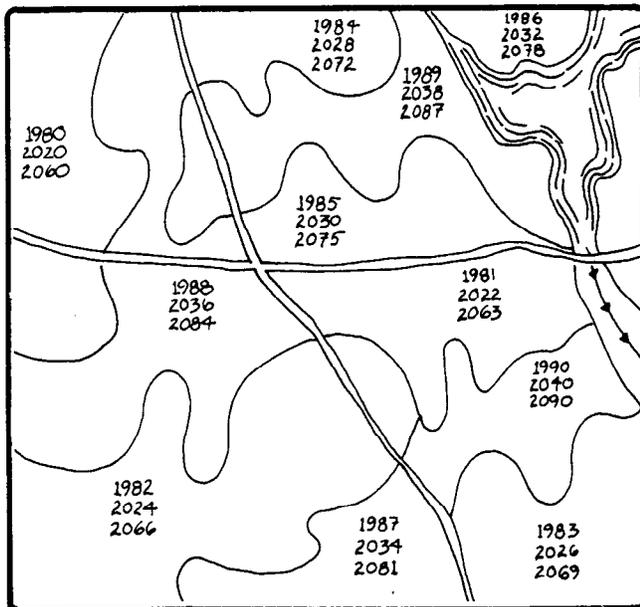


Figure 5. Map of 160-acre area of aspen on a good site showing harvest dates for different areas.

Even when a stand is mature, harvest of part of the stand can be deferred for a time. In Figure 6 about half of the “40” can be cut immediately, while the other half is cut 5–10 years later, after reproduction is established on the first half.

## Thinning

A commercial thinning (one that yields salable products) can be done on aspen stands that are only 25–35 years of age, but only on areas with a site index of 70 or better. The recommended procedure is to remove all trees except for 200–300 crop trees per acre. The trees left as crop trees should be the best and largest trees of the stand and should be spaced as uniformly as possible. Crop trees can then be harvested at maturity by clearcutting. The thinning can yield 10–15 cords per acre and the final harvest cut should yield nearly as much cordwood as the unthinned stand. The thinned stand will also yield a larger and higher-quality sawlog harvest.

## Mixtures of Aspen and Other Species

In the Lake States, quaking aspen often grows in stands that include varying proportions of other species. Frequent associations include aspen with white (paper) birch, northern hardwoods (sugar maple, yellow birch, basswood, and red oak), or conifers (pines, spruces, balsam fir, and northern white-cedar).

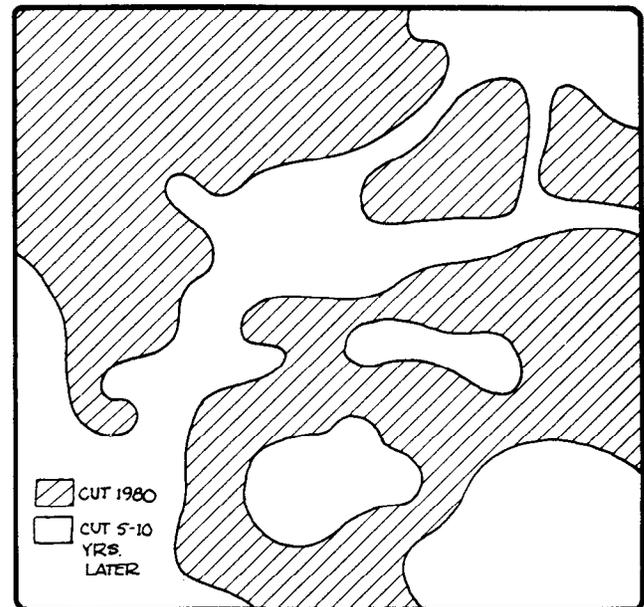


Figure 6. Harvest map of a 40-acre stand of aspen on a good site.

Where aspen is growing with white birch, management probably should favor aspen unless there is enough high-quality birch available for sawlogs or veneer. This is rarely the case, and birch is usually clearcut along with the aspen to promote aspen suckers. White birch is also a relatively fast-growing, short-lived intolerant species, but usually it has less value than aspen (especially for pulp).

Where aspen is growing with more valuable northern hardwoods—especially on sites that will yield good-quality hardwoods—the hardwoods are usually encouraged in the next stand. When the aspen is cut, the slow-growing, shade-tolerant hardwoods are left. This will reduce aspen regeneration, but it is likely that some aspen will grow to maturity and can be cut again. But eventually the northern hardwoods will replace the intolerant aspen.

Where aspen is growing with white spruce and balsam fir, it is possible to manage these two different types concurrently. In a stand of mature or nearly mature aspen with a good understory of conifers, the aspen should be cut at maturity, releasing the conifer understory. Usually, there will be enough open areas that some aspen suckering will occur. As the aspen suckers grow, the released conifers will also be growing to merchantable size. Ultimately, a mature stand of conifers containing scattered aspen trees will result. Because the conifers are quite shade-tolerant, there will also be some conifer seedlings in the stand. The aspen and mature conifers should then be clearcut to encourage aspen suckers which will soon overtop the slower growing seedlings. The aspen will mature before the conifers and the result will be a mature stand of aspen with a good understory of conifers and the cycle can be started over again. If for some reason the initial reproduction of conifers is sparse, clearcuts should be small (preferably less than 20 acres), or, if larger, no wider than 200 feet to encourage conifer seeds to blow in from adjacent trees.

## Aspen and Wildlife

In the aspen forest type, the objectives of producing both timber and wildlife are fully compatible because the clearcutting necessary to perpetuate aspen results in good habitat for many species of wildlife. Small clearcuts, say 10-20 acres, are best for wildlife and woodland appearances. They are also more compatible with smaller ownerships. Whether a landowner can sell standing trees (called stumpage) in these small clearcuts, or whether they need to be cut at his own expense, will be determined in large part by availability of local markets, quality and quantity of the wood, road construction costs, skidding costs, distance from markets, etc. It is not unusual to sell aspen on better sites for a profit and still manage for wildlife with small clearcuts. An example is shown in Figure 4.

Ruffed grouse utilize aspen stands of all ages. Sucker stands 2–10 years old are important brood habitats. Grouse prefer sapling and pole stands 10–25 years old for overwintering and breeding cover. Stands over 25 years of age serve as an important food source.

Deer rely heavily on the aspen forest type, especially for spring and fall range. It is also important for winter range, particularly if it is within 1/2 mile of lowland conifers, which deer use for shelter. In addition, openings within the aspen type allow shrubs and herbs to grow, which helps provide the diverse vegetation deer need. To encourage deer, it is generally recommended that clearcuts in aspen be limited to less than 40 acres and preferably to 20 acres. Within 1/2 mile of winter deer yards short rotation management (25–30 years) is preferred. However, the shape of an opening is as important as its size; the more “edge” the opening provides, the better.

Beaver prefer the bark, leaves, twigs and branches of aspen to those of all other trees in the Lake States. Beaver populations may need to be controlled to prevent repeated cropping of sucker stands. Repeated cropping can result in death of the stand and food scarcity for future beaver populations.

Many other birds and mammals use aspen stands because of the diversity of vegetation this forest type provides. Cavity-nesting birds and mammals can be encouraged by leaving standing dead trees (called snags). These snags will not interfere with sucker regeneration of the new stand.

In all cases, management recommendations may have to be altered depending upon local conditions and ownership objectives.

## Competition and Enemies

Man has many competitors for the use of aspen. Deer eat the young sprouts, meadow mice and snowshoe hare eat the bark of young trees, male deer rub their antlers against the tender trunks, and beavers will fell aspen within 400 feet of their ponds.

Wildfire is an “enemy” of aspen because it can kill the thin-barked young trees, or cause wounds which allow access to insects and diseases. Among the many insects which attack aspens are the forest tent caterpillar, gypsy moth, and poplar borer. Among the diseases are *Hypoxylo*m canker, false tinder fungus, and *Armillaria* root rot. Foresters can identify most of these problems and can get help from Extension specialists for those they can't identify.

## Seeking Professional Help

Woodland management and timber marketing are complex procedures that are best handled by people with the necessary experience or training. Manage-

ment is further complicated when prescriptions are altered to emphasize a specific benefit, such as wildlife. If you have little or no expertise in these fields, get assistance from a forester. The Department of Natural Resources (DNR) has foresters and wildlife managers located throughout the state who can provide assistance at no cost. Some of the larger wood-based firms also provide forest management and marketing assistance to private woodland owners. In addition, consulting foresters provides a wide range of land management services for a fee. For addresses of these foresters, visit your local DNR or Extension office.

In this publication, guidelines are presented to assist individuals in managing aspen woodlands. Our suggestions are not meant to substitute for advice and assistance from foresters, but they should assist landowners in understanding and implementing aspen management techniques. For a technical discussion of aspen management, see the *Managers Handbook for Aspen in the North Central States, NC-36*, available from USDA Forest Service, North Central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, MN 55108.

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