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MANAGEMENT OVERVIEW

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The aspen ecosystem may be managed for any one or more of the assets discussed in PART III. RESOURCES AND USES. It is truly a multiple use type, especially in the West, where it has had limited marketability for its fiber (see the WOOD UTILIZATION chapter). Many forest types are managed for their economic value as timber. This value is the source of money for management activities, such as access road construction and maintenance, harvesting costs, regeneration costs, intermediate stand treatments, and other silvicultural treatments.

In the West, however, aspen forests have been used primarily for wildlife habitat, livestock forage, watershed protection, and esthetics and recreation. These uses seldom have generated enough money to actively manage much of the overstory portion of the aspen ecosystem. As a result, adequate measures have not been taken to ensure that this seral species is retained where other resources benefit from its presence. Because of the decrease in severe fires resulting from modern forest fire prevention and suppression practices, natural succession is replacing aspen with conifers or other vegetation types (see the FIRE chapter). Without specific management efforts, some aspen forests in the West eventually may be replaced by coniferous forest or other non-forest vegetation.

On many sites, aspen may not persist unless the stand is periodically destroyed by some event that rejuvenates it by initiating a new stand. Without such an event, aspen can be displaced on many sites by conifers, shrubs, or grass. This successional process is partially offset by aspen dominating areas where fire, insects, or cutting has removed conifer stands. Also, aspen stands sometimes spread into neighboring meadows. (See the VEGETATIVE REGENERATION and FIRE chapters.)

Climax aspen, in the absence of fire or cutting, will become uneven-aged (see the MORPHOLOGY chapter). Uneven-aged aspen stands do not produce optimum yields of wood products. Esthetically, they may be inferior to mosaics of even-aged patches. Compared to forests composed of several age classes in even-aged patches, uneven-aged stands are inferior habitat for some important wildlife species, such as ruffed grouse (see the WILDLIFE chapter).

Many good sites in the West that could produce large yields of aspen fiber are occupied with mostly overmature or uneven-aged aspen stands. They have the potential to be managed as commercial stands if they are regenerated before their eventual replacement by other vegetation. Either suitable markets to utilize these stands need to develop, or the stands must be regenerated at considerable expense to renew their productivity.

Problems in Aspen Management

The volume of aspen harvested annually in the western United States has been relatively small (see the WOOD RESOURCE chapter). Furthermore, annual growth of these predominantly mature and over-mature aspen stands in the West has been much less than their potential under intensive management. As discussed in the WOOD UTILIZATION chapter, the shortage of markets for quaking aspen timber from the West has severely restrained the potential for aspen management.

However, the situation may be changing. Aspen is a rapidly growing source of fiber. As human populations increase and technology advances, this fiber source will become more merchantable, and more likely to be managed as a commercial timber resource (see the WOOD UTILIZATION chapter).

Intensive short-rotation management of aspen is becoming increasingly operational in the Lake States (Bella and Jarvis 1967, Boyle et al. 1973, Einspahr and Benson 1968, Ek and Brodie 1975, Hunt and Keays 1973b, Perala 1973, USDA Forest Service 1976b). Short-rotation management may involve planting selected or genetically improved stock, irrigation and fertilization, and close monitoring and control of damaging agents (see the REGENERATION and INTERMEDIATE TREATMENTS chapters). With this management option, the stand is clearcut at the culmination of either mean annual dry weight growth or net annual growth in cubic volume of stems—usually before age 30 in the Lake States. The entire tree may be chipped on-site, which assures maximum use of most of the fiber produced.

In the West, intensive management of aspen as practiced in the Lake States is unlikely in the near future. Although markets are being developed to utilize small diameters, and sites exist which could support intensive management, the tremendous backlog of older stands with larger trees will have to be utilized before short rotation management becomes economically competitive.

Aspen management is expected to intensify in the West, however. Already, some mature and overmature stands are being harvested. During such harvests, usually the residual, unmerchantable trees are felled to stimulate maximum sucker regeneration and rapid development of a replacement stand. Occasional sucker stands are being thinned. The Southwestern (Crawford 1976), Rocky Mountain, and Intermountain Regions of the Forest Service have transferred part of their commercial aspen land into the regulated component, which requires specific management systems. Wood industries as well as land management agencies in the West are increasing their attention to expanding markets and improving industrial technology for aspen (USDA Forest Service 1976b).

Management Alternatives

Generally, an aspen stand can be successfully managed for several values simultaneously. Frequently, a treatment prescribed primarily to enhance one value enhances others also. Sometimes, however, a prescription that enhances one value substantially impairs others. Managers seldom have had precise means to evaluate immediate or long-term payoffs or trade-offs from alternative management prescriptions. In timber management, for example, past equations and tables for estimating timber yield capacities of sites were marginally satisfactory. More recent research in growth and yield, the development of new volume equations (Edminster et al. 1982), description of stand characteristics (Shepperd 1981), and development of procedures to evaluate trade-offs in local land management planning (Brown 1980) have provided managers with improved methods for better decisionmaking. Similarly, recent methodology to enhance water yields, to improve habitat for selected species of wildlife, and to stratify aspen community types have been made available (see the appropriate chapters in PART II. ECOLOGY and PART III. RESOURCES AND USES, and the MANAGEMENT FOR ESTHETICS AND RECREATION, FORAGE, WATER, AND WILDLIFE chapter).

Other information has been assembled to help managers formulate plans for managing aspen forests. For example, Perala (1977) developed a guide for aspen in the Lake States. Betters prepared a decision-making guideline for aspen management on the Routt National Forest in Colorado.[1] Western habitat and community type descriptions that include quaking aspen have been published (see the VEGETATION ASSOCIATIONS chapter). With these kinds of guidelines, and with the information presented in this book, managers have a better basis for making decisions about aspen management in the West.

Retaining Aspen

Decisions often need to be made about whether to retain aspen on a given site. For example, where aspen occurs in predominantly coniferous forests, management may favor conifers, aspen, or a mixed stand. Pure aspen stands may not be the most desirable vegetation in all cases. Land managers must consider the mix of resources and uses among the alternatives; the social and political constraints; and the costs of retaining, modifying, or converting the aspen.

In seral communities where aspen is to be retained as the permanent, dominant overstory, conifers should be discouraged from invading by cutting existing stock and removing adjoining seed sources. Management required for this option depends on the successional stage of the existing stand (Mueggler 1976b).

[1] *Betters, David R. 1976. The aspen: Guidelines for decision making. Report, Routt National Forest, Rocky Mountain Region, USDA Forest Service, 100 p. Steamboat Springs, Colo.*

Where conifers are preferable, a mixture of aspen can be a form of catastrophe insurance. Fire, extensive blowdown, or severe insect outbreaks may destroy pure stands of conifers; but, if appreciable aspen trees are scattered in the stand, they usually will reforest the site promptly (see the VEGETATIVE REGENERATION and FIRE chapters), thereby protecting the watershed and providing a nurse crop for reestablishment of shade-tolerant conifers (see the WATER AND WATERSHED and NURSE CROP chapters).

Alternating generations of aspen and conifer dominance may be desirable. On some sites, especially those with a high blowdown hazard, management of spruce-fir forests by shelterwood or selection cutting methods that leave residual trees may be risky. Yet, overstory shade is desirable for spruce and fir regeneration (Alexander 1974, 1984; Alexander and Engelby 1983). If aspen is a fairly abundant component of the conifer stand, the stand could be clearcut with the expectation that aspen will promptly reforest the site, thereby forming a nurse crop to shade young conifer seedlings, which should result in higher survival rates or lower seed/seedling ratios. If clearcut openings are small enough to be adequately reseeded by spruce and fir in stands surrounding the openings (Alexander 1974, Jones 1974b), or if most advanced conifer regeneration survives harvesting and slash treatment, a coniferous understory could become established quickly. This understory would dominate the site when the aspen are removed several years later. Aspen suckers would fill the gaps and provide an aspen-conifer mix for the next cycle. A similar approach could be used with a shelterwood system in mixed spruce-fir—aspen stands to allow either heavier shelterwood cutting intensities, fewer entries, or less time between entries. Alternating generations would take advantage of natural processes, providing inexpensive and simple management. If markets for aspen increase, this system may become increasingly attractive.

However, this method may have drawbacks. The environment provided by the aspen nurse crop also is suitable for establishment of herbaceous understory vegetation. Competition from understory species in some plant communities can be severe enough to have a detrimental effect on conifer seedling establishment. Therefore, it is essential to understand the dynamics of plant communities in such areas before using seral aspen stands as nurse crops.

Converting Aspen

Based on the total mix of values, a different vegetation type sometimes may be preferred on a site occupied by aspen. For example, if aspen is abundant in an area, local esthetics may be improved by increasing the acreage of conifers or other vegetation types, thereby increasing the variety of scenery and wildlife habitat (see the MANAGEMENT FOR ESTHETICS AND RECREATION, FORAGE, WATER, AND WILDLIFE chapter). If the market value per unit volume of coniferous species remains higher than that of aspen, converting some of these sites to conifers might be justified economically.

Forage in meadows commonly is more suitable for cattle than forage under aspen. Furthermore, open areas usually produce more herbage (see the FORAGE chapter). In areas with extensive stands of aspen growing on poor sites, converting aspen to meadow may be desirable. In areas with extensive forest, the scenic qualities may be improved if sizes, shapes, and locations of these constructed meadows are designed to complement the landscape.

Aspen or other forest types may be converted to herbaceous vegetation to increase water yields from important watersheds (Hibbert 1979). This also may increase livestock forage (see the MANAGEMENT FOR ESTHETICS AND RECREATION, FORAGE, WATER, AND WILDLIFE chapter). However, wildlife habitat, vegetation diversity, timber values, and esthetic quality are likely to diminish, especially if such conversion is widespread.

If long-term management of seral aspen is for conifer conversion, and conifer regeneration is established in the stand already, it may be released by removing the aspen overstory. Success of this option depends on the tolerance of the conifer species released, the stocking density of conifers, the productive capacity of the site, and the resprouting ability of the aspen clones (see the VEGETATIVE REGENERATION chapter). Increase in conifer growth resulting from removal of an aspen overstory has not been documented in the West, but has been reported in Ontario (Berry 1982).

The costs of converting the aspen to another species mix and managing that replacement vegetation is an important factor in decisionmaking. The total of all values and benefits (both tangible and intangible) of the new resource mix should be greater than the total of all values and benefits lost by removal of the aspen. A careful, long-range cost-benefit analysis should be made before beginning any extensive conversion of aspen to other vegetation types.