

**Proceedings of the
SYMPOSIUM ON
INTENSIVE CULTURE OF
NORTHERN FOREST TYPES**



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FOREWORD

THE NORTHERN FOREST TYPES constitute a vast natural resource for the United States and Canada. For instance, in the eastern United States there are more than 10 million acres of commercial forest land supporting spruce and fir types alone. The magnitude and variety of this resource is such that treating it in any detail at a 3-day meeting was impossible. Rather, the idea that germinated and developed into this symposium was to present a broad picture of the extent of our knowledge of intensive cultural techniques, the status and trends of our research in the northern forest types, and some actual experiences in managing this resource; and to explore those factors that affect our use of the intensive cultural techniques we have at hand.

There is no doubt that we face a new era in the management of northern forests. The production of wood products is no longer the primary objective of many owners, and increased pressure for the social values of our forests is being felt by all landowners. We must recognize these other forest values, which in turn dictates intensification of all aspects of forest management if we are to meet the future demands of a wood-hungry society.

The enthusiastic efforts of the symposium sponsors—the School of Forest Resources, University of Maine; the Maine Bureau of Forestry; the Maine Forest Products Council; and the U.S.D.A. Forest Service—and the individuals behind those efforts, should be commended. Special thanks are due to Great Northern Nekoosa, Inc., and Brooks B. Mills for their help in providing interesting field trips, and to the Casco Bank and Trust Co. for sponsoring the symposium brochure. Also, without the enthusiastic participation of the experts invited to present papers, and the moderators of each session, the Symposium could not have taken place.

—**BARTON M. BLUM**
Symposium Chairman

PUBLISHER'S NOTE

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SYMPOSIUM ON
INTENSIVE CULTURE OF
NORTHERN FOREST TYPES**

*held 20-22 July 1976 at Nutting Hall, University of Maine, at
Orono.*

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COMPATABILITY OF INTENSIVE TIMBER CULTURE
WITH RECREATION, WATER AND WILDLIFE MANAGEMENT

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Abstract

Two principles of ecology can be applied to make management for recreation, water, and wildlife habitat compatible with timber management. They are diversity within plant communities (i.e. timber types) and interspersion of these diverse communities in place and time. Intensive cultural operations can be the tool to create the right mixture of diversity and interspersion to serve the priority needs of the landowner. This requires imaginative planning and the recognition of key-value areas. Areas where recreation, water, and wildlife assume the key position are relatively small compared with timber. Usually, timber operations can be carried out on at least eighty percent of the land with only slight modification to accommodate other resource values. Forest management based on such a multiple-resource approach overcomes small losses in timber income with large gains in public acceptance.

Reliable information links timber with recreation, timber with water, and timber with wildlife, but I can find no investigation that considers all of these at one time. My assignment is to lay the groundwork for pulling these four values together into one management package for the forest landowner. Recreation, water, and wildlife have different meanings to different people, so I will begin by defining what they mean in this paper.

DEFINITIONS

Recreation

Forest recreationists can be separated into three broad groups (Fletcher 1975). At one extreme are the relatively few but vocal solitude seekers who require large undisturbed, inaccessible back-country. At the other extreme is a larger group of socializers who derive their pleasure from resorts, fancy campgrounds, and other places where man-made facilities dominate the landscape. Although it is important to satisfy the needs of both these groups,

I am assuming that public agencies will provide for the solitude seekers, and private capital will take care of the socializers. Seldom does either group see timber cultural operations in action.

This paper is concerned only with that vast in-between group of moderates who may enjoy some solitude and socializing in small doses but derive their greatest satisfaction from a casual type of recreation in a more natural forest environment. These are dispersed recreationists who use the woods for such activities as pleasure driving, hiking, bicycling, picnicking, hunting, fishing, birding, nature study, photographing, horse back riding, and casual camping.

Most of these activities require some access for vehicles, along with small woods roads and trails for walking into remote areas of the forest. The quality of the experience is based mostly on visual impressions of the forest setting. Eighty-seven percent of man's perception is based on sight (USDA, 1973), and aesthetically pleasing landscapes relate directly to high quality experiences. In other words, recreation in this paper means forest aesthetics.

Water

Our main concern is the effect of manipulating forest vegetation on the quantity and quality of water appearing in the forest in the form of wetlands (marshes, shallow-water areas, swamps and bogs), springs and seeps, streams, lakes, and reservoirs. Wetlands attract recreationists and scientists because of their special ecological values, and they provide habitats for unique forms of plant and animal life rarely found elsewhere in the forest.

Many springs and seeps have these same values, and they supply drinking water for both humans and wildlife. The fishery values of streams, lakes, and reservoirs attract anglers. Treatment of riparian vegetation is especially critical, but any cultural operations which affect underground and surface flows to these water areas are also important.

Wildlife

Wildlife includes primarily birds, fish, and mammals, although lesser forms are considered if they have special scientific or public-interest value. Game and nongame species are considered equally, unless the landowner indicates otherwise. The goal is to insure healthy populations of as many species as possible. The system to achieve this is referred to as "management for species richness" (Evans 1974). It allows special attention to the habitats of unusual interest such as eagle nesting sites, locally unique plants and animals, songbird habitat along nature trails, and deer yards.

CONCEPTS

Ecologists and wildlife managers use two guiding principles or concepts: diversity and interspersion. I believe both of these can be used, in different combinations, to set priorities and procedures for coordinating recreation, water, and wildlife management into a single forest management plan. Cultural operations carried out by timber managers should be a major tool for achieving coordinated action. There will be a few exceptions where relatively small special-interest or sensitive areas need prescriptions by a biologist, hydrologist, landscape architect, or some other nontimber specialist to give full recognition to the various resources.

Diversity

Diversity is the amount of variation that exists in plant and animal communities. It is synonymous with variety. Some examples are:

(a) Successional stages within the same timber type, such as bare ground, early invaders (herbs and shrubs) and stands dominating by seedlings, saplings, poles, and sawtimber; i.e. certain species prefer young stands while others may be found only in old growth.

(b) Border between two broad timber types such as northern hardwoods and spruce-fir.

(c) Nontimber areas like grassy fields, bogs, log landings, water areas, fire lanes, and facility right-of-ways.

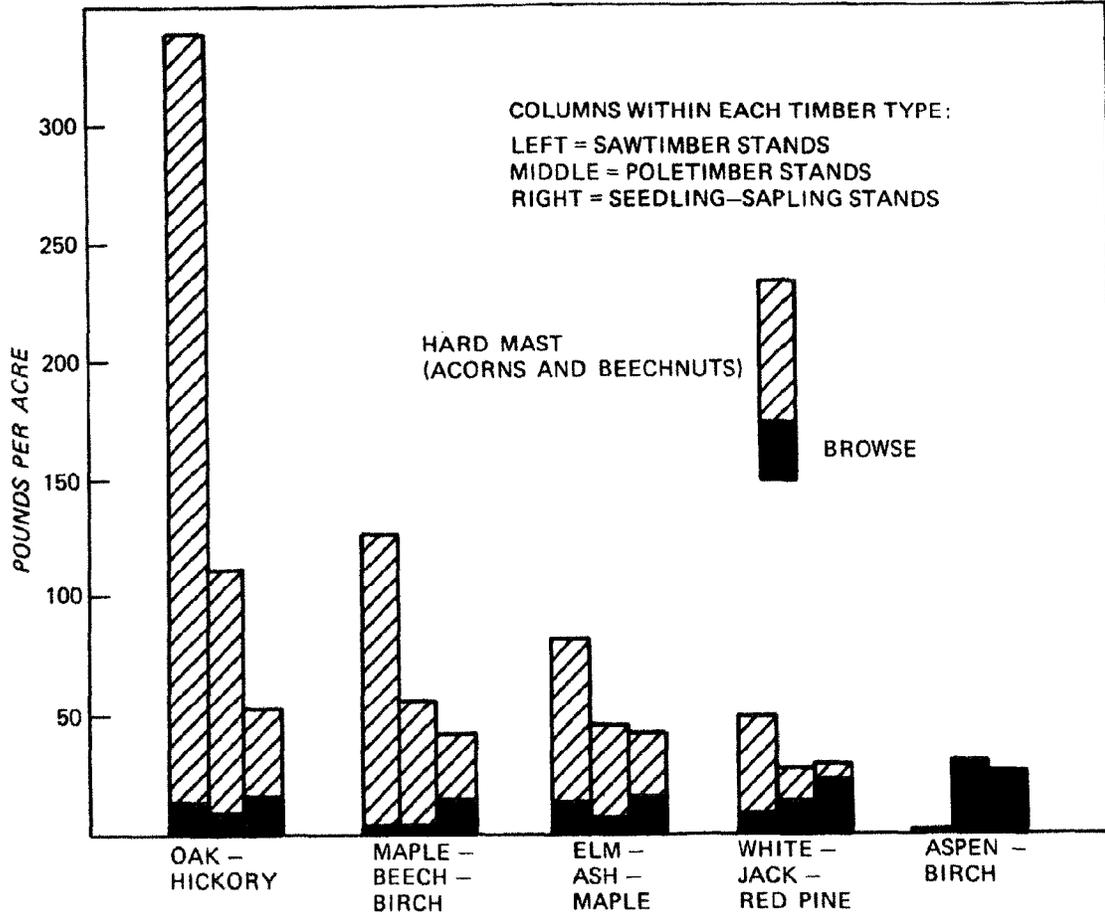
(d) Isolated stands of trees which are not typical of the surrounding timber type such as a beech-birch-maple stand within a spruce-fir type, or an aspen-birch stand in a northern hardwood type.

(e) Large conifer plantations broken up by unplanted strips.

Diversity occurs where different plant communities or successional stages within them come together. Wildlifers call this edge. The forest edge habitat usually contains many of the plant and animal species of each of the adjoining communities plus those characteristic of (and sometimes restricted to) the edge habitat itself. For example, both the diversity of bird species and the density of some are greater in the edge than in either community flanking it (Odum, 1959).

An example of the need for diversity is shown in Figure 1. Information comes from Barnes (1976) who used

Figure 1. Relative importance of winter deer foods by timber type and stand size class in the seven southern counties of New Hampshire.



Forest Service survey plots to evaluate the amount of woody browse and hard mast (acorns and beechnuts) available to deer during the winter. He gives results according to three age classes in each of five forest types found in the seven southern counties of New Hampshire. Mast and browse are staple winter deer foods.

To have both mast and browse requires a combination of timber types and age classes. For instance, a sawtimber stand in the maple-beech-birch type is a relative high producer of mast but a very low producer of browse. A pole or seedling-sapling stand of aspen-birch, on the other hand, is a very high producer of browse but provides no mast at all. This means that if a young stand of aspen-birch adjoins a maple-beech-birch sawtimber stand, there would be ample supplies of both browse and mast. Diversity, in this case, results in improved winter deer range.

Another example of how diversity works in favor of wildlife comes from an Ontario study of breeding birds in relation to three broad timber types (MacDonald 1965).

<u>Timber Type</u>	<u>Bird Species Represented</u>	<u>Pairs per 10 Acres</u>
Northern Hardwood with Mixed Pine	18	36
Semi-Open Pine	6	15
Pine Plantations	1	1

Interspersion

Interspersion is the degree to which different plant communities or successional stages -- in other words, diverse habitats -- are randomly mixed within the mobility range of wildlife and recreationists, or within a watershed.

We can use clearcutting on a 200-acre woodlot to illustrate. If there were one 25-acre clearcut in the middle of the lot, there would be localized diversity but poor interspersion because this diverse condition is not repeated elsewhere. On the other hand, if there were five 5-acre clearcuts scattered over the lot, one in each 40-acre block, there would be good interspersion.

We know that diversity combined with interspersion is extremely important in managing wildlife habitat because they combine to create a good assortment of places, called niches, where various species can find suitable habitat to feed, hide, rest, sleep, play, and breed within their home range. Diversity and interspersion are also important considerations in forest aesthetics and watershed management.

Forest Aesthetics

Those in the environmental planning profession use three basic concepts -- variety, harmony, and contrast -- and the three are interrelated (USDA 1965). On the subject of variety, which is the same as diversity, this source states:

"Variety produces that changing quality of the landscape that captures and holds one's interest. A continuing diversity or change leads one to anticipate something different and delightful around the next bend in the trail or beyond the next ridge. In planning for variety one should ask, "How will people use or view this?" Is it both functional and interesting, or is it too much like that which has gone before? Variety is truly the spice of life, but it must not be allowed to run wild. It must be balanced with just the right amount of repetition to prevent chaos and confusion."

There is no question that timber cultural operations can be planned to create that "right amount of repetition."

Water Management

Normally, water yield increases directly with the amount of basal area removed. Consequently, even-aged management has a greater effect on the magnitude of water yield than uneven-aged management (Curtis and Ripley 1975). Light thinnings rarely affect streamflow, but clearcutting on a northeast deciduous forest can increase annual water yield the first year by 4 to 12 inches. These increases decline each year after cutting, and in 10 to 15 years water yields return to pretreatment levels (Lull and Reinhart 1967).

It follows that to maintain a high sustained water yield, new areas must be cut periodically as earlier cuts mature. These cuts create diversity and interspersion. They can be planned in space and time to enhance aesthetics and wildlife habitat.

EXAMPLES

Now we will look at some examples of how aesthetics, water, and wildlife can be coordinated for their mutual advantage as cultural and other operations are carried out as a part of timber management work. Selected practices are shown in Table 1. Several of the recreation (aesthetics) examples are taken from Noyes (1968). Some modifications benefit all three resources simultaneously. These are list-

Table 1. Examples of how recreation, water, and wildlife values can be enhanced by modification of certain timber management operations.

	Recreation (<u>aesthetics</u>)	Water (<u>yield</u>)	Wildlife (<u>habitat</u>)
1. Plantation Establishment	Create variety by planting evergreens in pure deciduous stands, and vice versa.	Favor deciduous over evergreen trees. Thin plantations frequently to break up canopy.	Leave unplanted travel lanes every 600 feet. Thin frequently to favor ground vegetation.
2. Weeding	Favor trees with aesthetically pleasing crown, bark, foliage, and flower colors. Leave trees not commonplace to location.	No measurable effects	Favor trees and shrubs with high food or cover values: i.e. mountain ash, crab apple, and small hemlocks.
3. Pruning	Concentrate work along trails and wood roads for easier access and greater safety. Maintain some naturalness by not overpruning (i.e. 100 crop trees per acre).	Slight increase in water reaching forest floor.	Leave live unpruned patches along roads and trails used for birding. Pile branches for wildlife cover.
4. Improvement Cutting	Create vistas or views of unique features by heavy cutting. Avoid deadening trees in places frequently seen by people.	Cut heavier than usual and frequently as possible. Favor retention of deciduous over evergreen trees.	Leave productive mast-producing and den trees. Release patches of small evergreens for cover.

Table 1. (cont.)

	Recreation (<u>aesthetics</u>)	Water (<u>yield</u>)	Wildlife (<u>habitat</u>)
5. Cutting for Uneven Aged Management	Use especially along roads, trails, water bodies, and recreation areas. Retain trees and shrubs of high aesthetic appeal. Log in dormant season to reduce residue mass. Lop tops.	Use single tree selection and cut lightly in buffer strips to prevent silting.	Favor group selection over single tree to put more "brush in the sun". Favor retention of best mast and den trees.
6. Cutting for Even Aged Management	Create undulating edges when regenerating, with small tongues of standing trees extending into cut area. Blend cuts into terrain. Scatter debris and keep it low.	Do not cut on steep slopes, erosive soils, or wet areas. Supervise operation closely to prevent damage to stream channels and other sensitive areas.	Shape large regeneration areas so short axis stays within average of 500 to 800 feet. Scatter cuts over management unit. Four 20-acre cuts better than one 80-acre.
7. Log Roads	Plan location for use after sale by recreationists for vehicle or foot access to high-interest spots. Leave roadside trees and shrubs with high aesthetic appeal.	Avoid locating roads in wet or poorly drained areas. Seed steep slopes with grass or clover to prevent erosion. If stream must be crossed, build bridge or use culverts.	"Daylight" some stretches to create early succession vegetation along edges. Seed roadbed with clover. Gate certain remote areas for hunters, birders, or others who want a back-country experience.

ed under the resource believed to be benefitted most. For example, daylighting and seeding log roads improves aesthetics, water yield, and wildlife habitat, but it is listed under wildlife as the most enhanced resource.

All the modifications shown in Table 1 result in increased diversity of one kind or another. Good interspersion results when these practices are scattered over the management unit. Modification of timber operations is the most practical way to achieve diversity and interspersion on the ground.

APPLICATION

The management program for the Quabbin Reservoir lands in Central Massachusetts illustrates how many of the principles, practices, and modifications discussed here can be applied. Highlights of this program are given in an article titled CURRENT MANAGEMENT PRACTICES ON METROPOLITAN BOSTON'S MUNICIPAL WATERSHEDS, by Bruce A. Spenser. It appears in Municipal Watershed Management Symposium Proceedings, 1975, available from the Northeastern Forest Experiment Station at Upper Darby, Pa. It is a good reference. Here are a few highlights:

Management zones are delineated, and specific management policy developed for each zone. Six zones are recognized, occupying the following percentages of the 75,000-acre management area.

<u>Area Use</u>	<u>Percent</u>
1. Watershed Management	83.0
2. Aesthetics	6.0
3. Protection	6.0
4. Administration	0.5
5. Wildlife	3.5
6. Recreation	1.0

Each zone requires specific silvicultural practices. The silvicultural goals are to maintain and improve the health and quality of the forest; salvage defective, mature and dead trees; and prepare sites for the regeneration of native species. Spenser states:

"In the past 10 years, watershed-management operations treated 10,000 acres of forest, and should have yielded an additional 3.3 billion gallons of water, valued at \$200,000, plus 33 million

board feet of stumpage valued at \$658,000. This decade (1970-1980) we will treat 12,000 acres and produce similar yields but of greater value. This increased water yield seems like a small contribution, but it is more economical and of higher quality than other additional sources of water."

Here is a Municipal District Commission in business primarily to produce quantity and quality water for human consumption. Significantly it accomplishes its goal with a very active timber improvement and harvesting program. At the same time it is responsive to aesthetic, recreation, and wildlife priorities -- good evidence of multi-resource compatibility. Application of the principles of diversity and interspersion, I believe, can help create and maintain this compatibility.

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