

WESTERN FORESTER

OREGON-WASHINGTON-INLAND EMPIRE-ALASKA SOCIETIES



Volume 44, Number 5

PORTLAND, OREGON

September/October 1999

Vegetation management: One of the most important tools in forestry

By J. Scott Ketchum, Mike Newton and Robin Rose

A common misconception is that because a forest existed on a piece of land, another forest will replace it after harvest. This is often not the case. What happens in the first few years after disturbance has a large impact later in the succession of an ecosystem. Many more species arrive on any one site than will ever actually flourish. Those species which compete most successfully for resources, or which can establish and persist on a site, will be the eventual winners. As foresters, our objectives and goals for a piece of land determine which of these species we promote. As foresters, we also have a general preference for trees on most sites because, after all, a forest is a plant community dominated by trees.

Vegetation management can be defined as steering an ecosystem to a desired set of conditions by manipulating the colonizers during secondary succession. Next to planting seedlings, vegetation management (weed control) is the primary tool used by foresters to reestablish trees. As a forestry tool, vegetation management has been around for over 40 years. In the early days, vegetation management was primarily used to enhance wildlife objectives. In more recent times, especially on private ownership, the emphasis has been put more on timber production, while on federal and state lands, the emphasis is on meeting multiple objectives. Presently, the majority of timber companies that reforest sites use at least one herbicide treatment if not two to meet state reforestation regulations and ensure a vigorously growing stand.

Vegetation control by foresters is often under attack from the envi-



Studies have shown that the amount of vegetation cover on a site directly correlates with plantation damage from nippers and clipper. (Photo courtesy of Starker Forests)

ronmental community principally because herbicides are the tool of choice. For the past 30 years, a variety of methodologies have been tried to control unwanted vegetation including machine removal, manual slashing, broadcast burning, grazing, mulch mats and naturally occurring pathogens. Herbicides have come out on top in terms of safety and effectiveness.

Newton and Dost, researchers at Oregon State University, prepared a detailed risk assessment comparing herbicides with other methods in 1984. Interestingly, in terms of personal safety and potential to cause environmental harm, herbi-

cides consistently were the best choice. More recently, in 1995, the Vegetation Management Alternatives Program (VMAP) in Canada, with a budget of several million dollars, investigated a variety of alternatives to herbicides. Many of these were presented at the 3rd International Conference on Forest Vegetation Management. Repeatedly, it was demonstrated that herbicide use was the most effective method of creating conditions promoting tree growth.

Control of herbaceous species

Regardless of how vegetation is controlled, understanding which species to target is a fundamental question in reforestation weed control. Early in the development of forest vegetation management theory, most foresters focused on controlling the woody or shrubby component on the site and herbaceous species were considered to have only a minor competitive role. In the last 5-10 years, evidence has shifted this view. Research conducted by Mike Newton and also the Vegetation Management Research Cooperative (VMRC) at Oregon State University, among others, have demonstrated that early herbaceous competition is often the most damaging form of competition during the first 3-5 years of plantation establishment. This same concept has been demonstrated in the southern Unit-

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ed States pine forests, boreal Canadian forests, New Zealand and Australia. Controlling early herbaceous vegetation is one of the best ways to ensure successful reforestation, especially if woody species are suppressed during site preparation. It is amazing that with all this research many foresters still ignore herbaceous competition, and in many cases, still seed sites with grasses immediately after conifer planting!

Considerable effort has been put toward controlling vegetation in the few feet surrounding planted conifers. These "spot weed control" treatments are used to reduce costs by reducing the amount of herbicides used per acre or to lessen perceived environmental hazards. Additionally, spot weed control is often used when manual release efforts are used. Research by the VMRC suggests that moderate areas (16 to 36 square feet) of weed control can aid in conifer survival and growth, but to maximize growth, broadcast weed control is necessary.

Riparian management

Establishing conifers in riparian areas is a hot topic in forestry. It is expected that conifers will eventually provide a source of woody stream debris and help keep stream temperatures low through shading. Vegetation is generally quite robust in these environments, making conifer establishment difficult. As we experiment more in riparian areas, tools such as herbicides, mulch mats and manual slashing will be increasingly important and likely mandatory for success.

Nippers and Clippers

Another area often overlooked is the influence weed control can have on damage from gophers and rodents, otherwise known as nippers and clippers. One of the advantages of an aggressive early weed control program is a dramatic reduction in seedling damage from these critters. This is due, in large part, to removing food sources and cover from predators. Several studies have shown that the amount of vegetation cover on a site directly correlates with plantation damage from

animals. Damage to conifer seedlings from large herbivores such as deer and elk can be an especially difficult problem. It is usually counterproductive to plant attractive forage cover to lure animals away from tree seedlings. It tends to draw in animals that may forage on trees as well as the cover crop. Furthermore, research has shown that fast growing trees in weed-free areas can recover from and grow above browse faster than those growing in competitive cover.

Noxious weeds

Exotic weeds are becoming an increasingly important issue in forestry although the problem has been severe for decades. Many of the early invaders on harvested sites are exotic plant species. If left unchecked, many of these species can delay forest establishment for decades. Additionally, the plants are vectors for invasion of exotics onto other disturbed sites, including areas not under forest production. By getting in early and directing

succession to specific desired conditions, the influence of these exotics can be greatly diminished.

Accuracy of growth models

The growth expressed on sites receiving intensive early vegetation management is considerably above that predicted by current growth models. This is especially true when coupled with advances in nursery technology. The second-growth stands used by biometricians to create stand level growth models were generally established naturally following prior harvests. Consequently, they established under conditions much different from modern plantations. One of the challenges in the future will be to develop growth models that more accurately predict conditions in planted forests under a variety of early silvicultural treatments.

Effects of fast-growing stands

In the short term, one of the ramifications of faster growing stands in

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concert with newer harvest and milling technologies is a decline in the total number of acres requiring precommercial thinning. Currently, the first entry into many highly productive sites is a commercial harvest versus a precommercial thinning of days past. The economic benefits resulting from this shift in management are obvious. The long-term effect of intensively managed stands is still not fully understood. Whether intensive early vegetation management will actually increase the overall yield from a site is unknown; however, early results suggest that rotation ages may be shortened or yields substantially increased.

There are other issues concerning faster growing stands that we do not fully understand. For example, the incidence of serpentine stems and ramiform branching in Douglas-fir is often higher in faster growing stands. Both of these result in stem defects that can decrease the value and quality of wood. In addition, specific gravity and strength of wood made up of large rings may be of lower quality than the tighter rings associated with slower growing timber. More work is needed to address both of these issues. Interim findings suggest that wood quality improves with age of the stand, but rate of growth is poorly correlated with density and perhaps fiber length.

Future challenges

As we enter the next century,

greater social pressures will be exerted on our forests. Society demands many things from our forested land including maintaining "ecosystem function," greater recreational opportunities, management for sensitive species and continued production of forest products. These objectives are often contradictory, and inevitably, foresters are expected to produce more with less ground. To increase productivity, foresters need to pay greater attention to integrating current reforestation strategies and developing new ones. Greater care is needed in how and when harvesting is performed so soils are maintained or enhanced. Improvements in genetic seed sources, nursery management, and seedling technology need to be encouraged. Stocking levels to meet future production goals can be optimized by site and products desired. Improved understanding about how all of these factors integrate with vegetation management and among each other is coming. Integration is the key. Vegetation management or any of the above practices alone will not result in targets and objectives being met. Foresters must approach reforestation in a holistic manner if we are to meet society's needs.

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Guest Editorial

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are commonly referred to as natural resource "dependent" communities. Seldom are the truly resource dependent communities like Boulder, Denver, Detroit or Boston ever referred to as such.

One of the relatively little known aspects of Aldo Leopold's career is the years he spent at the Forest Service's Forest Products Lab at Madison, Wisconsin. While there, he spoke of the need for responsible consumption. In 1928, he wrote:

"The American public for many years has been abusing the wasteful lumberman. A public which lives in wooden houses should be careful about throwing stones at lumbermen, even wasteful ones, until it has learned how its own arbitrary demands as to kinds and qualities of lumber, help cause the waste which it decries."

If management of land has an ethical content, why does not consumption have a corresponding one as well? Is there a need for a "personal consumption ethic" to go along with Leopold's land ethic?

Ecosystem management or ecological sustainability on public lands will have weak or non-existent ethical credentials and certainly will never be a truly holistic approach to resource management until the consumption side of the equation becomes an integral part of the solution, rather than an afterthought, as it is today. Belated adoption of Leopold's land ethic was relatively easy. The true test as to whether a paradigm shift has really occurred in the United States will be whether society begins to see personal consumption choices as having an ethical and environmental content as well—and then acts upon them as such.

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