PRACTICE OF SILVICULTURE AND VEGETATION MANAGEMENT ON INDUSTRIAL TIMBERLANDS

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ABSTRACT

While some forest products companies have discontinued the use of prescribed burning, Westvaco Corporation's Southern Forest continues to make extensive use of prescribed fire to achieve a variety of objectives in its Ecosystem-Based Multiple Use Forest Management System℠. Although most burning is for hazard reduction in high-value plantations, other objectives include hardwood brush control, vegetation management for wildlife habitat and biodiversity, improved recreational opportunities, better access for cultural and harvesting activities, lower regeneration costs, and maintenance of special areas such as habitat for threatened and endangered species. Extensive preparation, quick access to excellent information and communication systems, detailed smoke management planning, and significant usage of aerial ignition allow maximum use of a very limited number of good burning days. Concerns and issues impacting the future use of prescribed fire include encroaching urbanization, increasing legal liabilities, and new clean air standards. More research is needed on the impacts of prescribed burning on tree growth and nutritional levels.

keywords: prescribed burning, prescribed fire, silviculture, smoke management, South Carolina, vegetation management.

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INTRODUCTION

It is an honor for Westvaco to be included in the world renowned Tall Timbers Fire Ecology Conference. Tall Timbers has long been recognized for its stewardship and conservation.

Similarly, responsible environmental stewardship has always been, and will continue to be, a cornerstone of Westvaco's business. We view it as a strategy that makes good business sense and ensures our longevity. Since our founding in 1888, we have managed our forests and related resources to supply our mills with the raw material to produce a variety of consumer products.

While this paper is not research-oriented, I believe it is beneficial to have a major industrial practitioner, such as Westvaco, as a participant on the program to bring perhaps a different perspective. While some forest products companies have discontinued the use of prescribed burning, we recognize its many benefits and continue to use it extensively.

I have divided the paper into 3 subject areas. First, I would like to give you a little background on Westvaco. Second, I would like to explain why and how we use prescribed fire in our ecosystem-based style of forest management. Finally, I would like to discuss some issues and concerns that could impact our use of prescribed burning in the future.

Our landbase, about 526,000 hectares in the eastern United States, supports 4 major mills that produce pulp, paper, packaging, and specialty chemicals. We also provide forest management assistance to private landowners through the Westvaco Cooperative Forest Management (CFM®) program on an additional 567,000 hectares of land.

Westvaco's forestlands are diverse in both geographic location and type, ranging from bottomland hardwood forests in the flood plain of the Mississippi River in western Kentucky and Tennessee, to the upland hardwood forests of West Virginia and western Virginia, to the pine forests of South Carolina's Lowcountry.

INNOVATIVE SILVICULTURE AND MANAGEMENT

Westvaco has been practicing "Innovative Silviculture and Vegetation Management" for many years. Throughout our history, Westvaco's forest management systems have changed and evolved as our forest researchers and land managers have developed new approaches to produce the wood fiber needed by our customers while protecting the forest's values and functions. Use of prescribed fire is one of those approaches. It has been and continues to be an integral part of our management system, particularly in our 202,000-hectare Southern Forest in the Coastal Plain of South Carolina (SC).

As the intensity of our management has increased, so has the need to maintain a balance among economic, environmental, and social concerns. We began developing an integrated ecosystem-based approach to managing our lands in the 1980's. Today, we call our system, Westvaco's Ecosystem-Based Multiple Use Forest Management System℠. This comprehensive system enables us to provide the wood and paper products people need and the forest they want.

Since 1980 we have been recognized >55 times by state and national organizations for our environ-

mental performance in forest and wildlife management. Since 1994, our ecosystem-based forest management has been the basis for most of the awards. For example in 1995, the Ecological Society of America recognized our efforts with its Corporate Achievement Award. We continue to modify and improve this system, in which intensively managed timber production areas are interspersed with forested areas dedicated to other uses such as water quality protection, habitat diversity, and maintenance of visual quality.

Classification of Forestland into Zones

To apply our system, we classify company forestland into one of 6 zones, each having 1 primary and numerous secondary functions. The 6 zones have as their primary management objectives: timber or fiber production, water quality, protection of special areas, wildlife and habitat diversity, visual quality, and ongoing management of non-forest zones.

We share our ecosystem-based, multiple use approach to forest management with others in our industry and anyone who has an interest. We make a special effort to share it with adjoining landowners and those participating in our CFM landowner assistance program. The maintenance of biodiversity cannot be left to chance. We must take proactive, science-based measures that maintain or create diverse wildlife habitats.

Like our ecosystem-based management, our use of prescribed fire has a long history and the techniques have evolved over time as new knowledge and practices become available. The history of prescribed fire at Westvaco goes back >45 years. It was 1952 when Southern Forest began a formal prescribed burning program. Since that time we have burned >800,000 hectares. That is the equivalent of treating all of our pineland in the Southern Forest 6 times in the last 45 years. We currently burn about 14,000 hectares annually.

Our primary goal in prescribed burning is to reduce understory fuel accumulations that pose a serious threat of wildfire. Our wildfire losses have averaged about 100 hectares per year over the last 10 years, much less than our historical average. Some of that reduction is due to improved detection, presuppression, and suppression techniques, but a large part of it is due to regular "fireproofing" of our forests through the use of prescribed fire.

Timber Management Zones

Let's look at the 3 zones where fire plays the most critical role in achieving our objectives. Since our primary role is to produce wood for our mills, fire management is mainly used for hazard reduction in pine stands in Timber Management Zones. These high-value pine plantations are managed very intensively through the application of technology such as genetic improvement, site preparation, fertilization, and competition control. Our use of herbicides and these other regeneration practices helps accelerate stand development and reduce fuel levels, permitting even earlier burning. These practices, along with aerial ignition, enable us to burn stands at a very young age.

We generally burn stands on a 3-year cycle. Some stands are burned more often, where the risk factor is high; others are burned less often. In fact, we have placed more emphasis on strategically locating burns to fireproof entire tracts by burning in perimeter stands around a larger unburned area.

Secondary objectives of our prescribed burning in Timber Management Zones include hardwood brush and understory vegetation control. Burning retards the understory vegetation that competes with trees for growing space and nutrients, while improving access for cultural and harvest activities, and reducing regeneration costs after harvest.

Vegetation management through prescribed fire, herbicides, and improved site preparation techniques has allowed us to eliminate site preparation broadcast burning and windrow burning. These techniques have improved site quality by eliminating the need to rake debris and have improved air quality by eliminating the heavier particulate matter emissions associated with debris burning.

Habitat Diversity Zones

Another objective of burning is for wildlife management and habitat development. While all of our prescribed burning is beneficial for wildlife habitat, it is a particularly important tool in the management of some of our Habitat Diversity Zones. These zones are managed less intensively for fiber production and more intensively for wildlife habitat and biodiversity. The real emphasis is on providing more mature forests and habitat than is available in our Timber Management Zones. We also use Habitat Diversity Zones to connect other zones so that we form a network of continuous mature forest habitat interspersed with our younger, vigorous stands.

We further classify each Habitat Diversity Zone into one of 9 major vegetative communities or habitat types that occur naturally in our area. We have general management practices and silvicultural prescriptions for each community type to protect its function and promote its desired habitat characteristics. Prescribed fire is a key management practice in five of these types: evergreen shrub, pine flatwoods, pine savannahs, pine hills, and mixed pine-hardwood.

We also consider habitat within prescribed-burning blocks. While the area in most blocks will never completely burn, in some areas higher ground is intentionally excluded from burning to provide nesting habitat as well as foraging opportunities, particularly for ground-nesting birds such as turkey and quail. This objective may be accomplished by disking or plowing to exclude fire from corners of areas to be burned or from 0.4–1.2 hectare areas or islands within these blocks.

We have also been increasing our use of growing season burns in Habitat Diversity Zones and other areas. Most burning is still done in the dormant season, but implementation of growing season burns in some

habitat types has widened the annual "window" for burning while enhancing the ecological character of longleaf pine and other ecosystems that are managed more specifically for wildlife habitat, biodiversity, and endangered species.

Special Areas

Endangered species and their habitats are part of our Special Area program. Special Areas are sites of unique or unusual biological, geological, or historical significance. Examples include historic sites, nature trails, and cemeteries, along with endangered species habitat.

Westvaco has been protecting the endangered red-cockaded woodpecker (RCW) since the late 1960's. Our first formal protection plan was created in 1971. On 26 March 1998, Secretary of the Interior Bruce Babbitt visited a Westvaco tract near Charleston, SC, to sign the first-ever statewide Safe Harbor Agreement. Westvaco had a major role in developing this agreement to protect the RCW. Prescribed burning is an important tool we use to maintain and improve RCW habitat. We also use prescribed fire to maintain and develop habitat for the state-endangered gopher tortoise.

The prescribed burning in these 3 zones makes up the bulk of our burning program. How we accomplish this burning has changed over the years.

Techniques

From the start of our prescribed burning program in 1952 till the late 1970's, all of our firing was done by hand. A major change in burning practices began to evolve in 1979 as we started working with the concept of aerial ignition.

In the Coastal Plain of SC we average only 10–20 acceptable burning days each year. This limited time frame, in addition to strict adherence to SC Smoke Management Guidelines, means that we need to be ready to take advantage of every good burning day or suitable opportunity. We prepare burning plans for about twice the amount of area we intend to burn in a given year to maximize our burning opportunities given certain weather conditions. We currently use 4 helicopter contractors. Benefits of aerial ignition include reduced personnel, increased safety for our ground crews, improved production, and earlier "fireproofing" of younger stands.

DISCUSSION AND MANAGEMENT IMPLICATIONS

Although there are many benefits of prescribed burning, there are also many concerns. One concern is the effect of fire on tree growth, especially from aerial ignition. Our earlier goal was to scorch $\leq$33% of the live crown. We routinely have relatively little scorch on most burns, but the tradeoff is a stand destroyed by wildfire against one that is fireproofed but with perhaps some slight growth loss. We certainly could use more research on the subject.

As I mentioned earlier, we are burning about 14,000 hectares per year. We had been burning about 20,000 hectares per year, but there are several reasons why we are now burning fewer hectares per year.

First, the extensive use of herbicides for herbaceous weed control and some site preparation applications has helped fireproof additional areas. Herbaceous weed control greatly reduces fuel loads in 1-year-old plantations and in subsequent years. Site preparation herbicides have been extremely effective in controlling ericaceous plant communities (rootmat areas), which are highly flammable, thus further reducing the threat of damaging wildfire on another segment of our landbase. However, we have not intentionally used herbicides to create firebreaks.

Second, the establishment of hardwood plantations on some of our pine sites will provide effective firebreaks, without burning. Third, we have fewer hectares available to prescribe burn because of our mid-rotation fertilization program. Fertilized stands should not be burned for $\geq$3 years.

It is becoming more difficult to burn in traditionally rural areas because of advancing urbanization. There are simply more smoke-sensitive areas and more people in those smoke- sensitive areas and highways. In some of our areas, forest management practices such as prescribed burning are poorly understood, which is one of the issues we face—continuing to educate the public and others about the value and benefits of prescribed fire. Although foresters have been advocating prescribed fire for years, it seems that only recently have the environmental community and others recognized its benefits. We need to continue this trend by informing the public through the news media about the virtues of burning and the results of studies, such as those described here at the conference.

Liability is another concern. And so, prescribed burns are planned very carefully and all Westvaco employees conducting burns are SC Certified Prescribed Fire Managers. South Carolina has a Prescribed Fire Act, which among other things, affords some protection from liability for Certified Prescribed Fire Managers who adhere to smoke management guidelines.

The SC Smoke Management Guidelines have been very effective in permitting prescribed fire while addressing social and environmental concerns. Every state should have similar guidelines and procedures. The management or lack of management of smoke will ultimately decide whether we can continue to use prescribed fire.

A relatively new issue for resource managers and prescribed burners is the changes in air quality standards for particulate matter. The federal Clean Air Act of 1977 accomplished several things. For those of us in forestry it was the impetus to look for ways to improve the quality of our prescribed burning. As a result of the Clean Air Act it became essential that we examine environmental and social impacts of burning, and that we weigh the benefits of burning against the costs, not just to us but to those in the communities

around us. The Clean Air Act has caused us to examine both the short-term and long-term effects and consequences of burning. I believe that we are better foresters and more responsible corporate citizens as a result.

However, recent changes in air quality requirements for suspended particulate matter size and related implementation guidelines could have an adverse impact on the use of prescribed fire as a forest management tool. When the U.S. Environmental Protection Agency (EPA) was writing air quality standards, we encouraged EPA to explicitly endorse prescribed burning and give states wide latitude to develop and implement air quality protection measures to ensure that prescribed burning remains an efficient, effective forest management tool. Studies show there is little risk of adverse effects from prescribed fire applied in accordance with current smoke management guidelines, as compared to wildfire. The literature actually shows that prescribed fire, correctly applied, results in improved long-term air quality by reducing wildfire emissions, as well as improving the health of forest ecosystems on which we all depend (Schaaf 1982, Scire and Tino 1996). We hope that organizations like Tall Timbers and the resource managers and researchers gathered here are working with EPA and the states to ensure regulations do not unnecessarily impact what is a very effective, economically sound tool for forest and wildlife management.

LITERATURE CITED

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