Committee on Resources

Subcommittee on Forests & Forest Health

Witness Testimony

Testimony on
Oversight hearing on
Regional Haze
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CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

Introductory Comments

Thank you for inviting me to present my views on prescribed burns, other management techniques, and fire economic impacts as these relate to your air quality deliberations. My views on these topics result from 28 years of experience studying fires, including five years as a seasonal firefighter and 23 years as researcher and professor in forest fire science. For the past 6 years I have served as Director of the Western Forest Fire Research Center (WESTFIRE) at Colorado State University, which performs integrative research into ecological, socio-economic and environmental effects of forest and rangeland fires. Current and recent projects have provided insights into the cost-effectiveness of mitigation efforts aimed at reducing consequences of wildfires. We focus on areas in need of fuels treatment and suggest appropriate management techniques for allowing people to live and work safely in fire-prone areas throughout the western US. Recently I have been invited to participate on the Fire Emissions Joint Forum of the Western Regional Air Partnership, which will be developing policies and methodologies for implementing recommendations from the Grand Canyon Visibility Transport Commission.

Overview

Fire has been a part of most terrestrial ecosystems for thousands of years. Lightning has provided a natural ignition source and humans have interacted with fire for more than 300,000 years. Humans have used fire to shape landscapes for perhaps the last 20,000 years. Combined with lightning ignitions, fire has created a diverse mosaic of so-called fire type plant communities. By the same token, ecologists point to the impacts of the past 100 years of fire suppression in the US, including excessive fuel buildups, stagnant dog-hair stands, increased disease and insect infestations, less diversity and numbers of wildlife, and ultimately, devastating wildfire conflagrations. These outcomes are symptoms of a general deterioration in forest health in affected areas. Compared to presettlement times, current forests appear denser, have many more small-diameter trees and fewer large trees, and support greater quantities of surface and canopy fuels.

The forests and wild areas of the US are the result of a long history of disturbance (such as fire) and also of human use. Most north American plant species are adapted to periodic fire recurrence and humans have manipulated forest and rangeland environments with fire, cutting, and other cultural activities. Fire has served humankind as a valuable tool; but we also know too well that unbridled fire can wreak havoc on our best-laid plans for enjoying both tangible and intangible products from the forest.

Recently, the use of fire has achieved credibility as a land management tool for achieving a variety of objectives. Under carefully prescribed conditions, fire has been used to reduce fuels, prepare seedbeds, control plant diseases, remove undesirable plant species, restore ecosystems, and improve wildlife habitat. Even so, surprisingly little is known of the relationship between fire and its effects, including impacts on air quality.

Smoke from fire contributes to regional haze and can adversely affect commerce and human health. On the other hand, fire may be an indispensable tool to the land manager for reducing the risk from future fires as well as for restoring forest health in many areas of the western US. Thus an emerging conflict is taking shape between the desire for clean air versus the inevitable and intentional ignition of the nation's wildlands. Further, tightening of air quality restrictions could inadvertently lead to more smoke and haze as a consequence of greater limitations on prescribed fire.

Fire Impacts on Air Quality

The Grand Canyon Visibility Transport Commission report summarizes conveniently in one document the effects of fire on air quality, especially from a visibility standpoint. According to this report, " emissions from fire (wildfire and prescribed fire) are an important episodic contributor to visibility-impairing aerosols, including organic carbon, elemental carbon, and particulate matter." The report also includes important gaps in our knowledge that can be addressed through future research.

The chemistry of smoke is complex and as yet incompletely specified, although the distribution of particle sizes is better known. The human health impacts from fire emissions aren't understood very well, although increased levels of fine particulate matter have been associated with higher levels of absenteeism, illness, and premature death. Better information is needed though the potential downside seems clear. We know that regional haze can lead to aircraft, marine vessel, and highway deaths in the short-term; long-term impacts of prolonged exposure haven't been studied conclusively.

Regional haze from fires usually doesn't garner the same attention as subdivisions aflame or massive evacuations. Even so, according to news reports the haze from the Florida fires was "visible on satellite pictures from space and evident 200 miles out into the Atlantic Ocean...causing health problems and curtailing outside activities," (USA Today 6/26/98). Closer to home, in 1994 an estimated 1.35 million tons of fine particulate matter was emitted from 65,700 fires that burned 3.8 million acres of federal land. During these incidents several northwestern US communities experienced smoke pollution episodes exceeding EPA standards adopted to protect human health. The downwind smoke plume from these northwestern US fires was visible 150 miles away.

Tradeoffs between Wild- and Prescribed Fires

In any given year anywhere from 1 to 7 million acres of forests and rangelands may burn by wildfires. These fires may have the greatest impact on visibility in all airsheds, but especially in Class I areas mandated by Congress for special air quality protection. Further, increased visibility impairment by fire is

likely to exceed any potential visibility improvements made possible by regulation of emissions from other sources.

The economic impact of wildfires can be substantial. In this decade we have had several $1 billion fire seasons. Although the losses from the 1998 Florida fires may not be known for some time, I have heard cost and damage estimates ranging from $300,000 to $.5 billion. The Oakland Hills fire in 1991 destroyed 3,000 homes, killed 25 people, and produced over $2 billion in costs and losses.

Of the elements comprising a fire's environment (fuel, weather, and topography), only fuels can be managed effectively to reduce the severity of eventual wildfires. The vast variety of fuel treatments fall into the following broad categories: disposal on site (e.g., burning), redistribution on site, physical removal, vegetation type conversion, and isolation. The types of fuel treatments that fall into these various categories can be quite numerous, e.g., hand piling, tractor piling, mechanical crushing or mastication and burning, dozer chaining, jackpot burning, chemical desiccation and burning, to name just a few.

Recently federal agencies with fire management responsibilities have embarked on an ambitious expansion in fuel treatment programs, with emphasis on prescribed fire and mechanical thinning. This effort is part of a larger attempt to restore and maintain ecosystem health while providing for public and firefighter safety. Reductions in wildfire costs are part of this ambitious agenda although many uncertainties remain about the magnitude of savings achievable. The agencies have identified 95 million acres of public land in need of hazardous fuel reduction, primarily in the western states. Currently, agencies are treating about 2 million acres annually; projections call for expansions to 3-6 million acres annually over the next decade. These projections are speculative but some suggest that fuel accumulations may continue to stockpile, even with the planned expansions in fuel reduction programs.

Prescribed fire is receiving much attention because it mimics natural fire processes and treatment costs are relatively low compared to other alternatives. Previous studies in California have documented that prescribed fires can produce comparable fuel hazard reduction but at 1/10 the cost per acre as mechanical treatments. At the same time, intentional burning does require skilled staff and reliance on suitable fuel moisture and wind conditions during burn execution. Escapes can be costly and and even modest increases in prescribed fire applications could significantly degrade air quality in a region. These risks can be mitigated through sound planning and professional execution, but these same risks cannot be eliminated completely.

Ultimately a combination of mechanical removal followed by prescribed fire may be the optimal treatment for many areas, especially those located at safe distances from human population centers. In such cases, the mechanical treatment could be used to prepare the fuelbed for safe burn execution while also providing potentially useful raw materials for wood products. Unfortunately, in many areas throughout the rural US markets aren't well developed for the small diameter trees and removable biomass that add to fire hazards when left behind in the forest. Further, the combination of mechanical plus fire treatments may not be feasible in park and wilderness areas. Access to these areas may be difficult and use of mechanized equipment may not be practical nor acceptable (administratively or socially) in these areas, many of which coincidentally may be designated for Class I protection. Finally I am finding through ongoing research for the USDA Forest Service that there are important knowledge gaps associated with efforts to reduce wildfire severity through prescribed fire and mechanical thinning.

Thus no single treatment is a panacea or will work in all situations, but each can play an important role if carried out in concert with a systematic and integrative planning process. In most landscapes a combination

of treatments will likely be required, rather than relying on one single treatment. Each proposed treatment needs to be evaluated on the basis of relative advantages and disadvantages compared to overall land management objectives for the area and relative costs associated with treatment alternatives.

Other potential solutions look beyond the technology of fuel hazard reduction. Promising examples include conversion of forest biomass to ethanol, creation of defensible space around home-sites and subdivisions, and citizen slash-mulching programs. With adequate incentives, community partnerships can be formed with industry and government to develop sustainable forestry initiatives that reduce fuel hazards while reviving the forest products sector. Another possibility involves forestry stewardship projects that promote fire-safe environments while providing a sustainable base of local employment. Last year Dr. Dennis Lynch, now Professor Emeritus at Colorado State University appeared before this subcommittee to promote stewardship contracts for forest restoration on national forest lands. I refer you to his written testimony before the subcommittee on March 18, 1997 for further details.

Ongoing Efforts and Information Needs

The projected expansion in fuels treatment programs has spawned the recognition of many uncertainties and information gaps associated with fuel treatment and wildfire management. The Federal Fire Science Initiative is an interagency collaborative effort aimed at bolstering fuels management research. Fire managers have long recognized the importance of fuels in managing a fire's environment, but relatively little emphasis had been directed toward understanding the scope and breadth of problems related to implementing a fuels management program. The Federal Fire Science Initiative represents a first attempt to address these problems programmatically on an inter-agency basis.

Many information gaps will remain even after the Initiative is completed. For example, it will be some time before we are able to predict relationships between fuel treatment expenditures and anticipated reductions in wildfire suppression costs. Other voids will relate to the optimal balance between wild and prescribed fires, especially as related to managing visibility and human health impacts from wildland combustion.

The Western Forest Fire Research Center (WESTFIRE) which I direct at Colorado State University has an established capability for collaborative research that assists agencies in answering questions about fire and fuels management. For example, a previous project assisted the Department of Interior in evaluating fuel treatments and management practices capable of reducing the likelihood of large fires. Another project assisted the National Park Service in identifying contributors to high versus low cost prescribed fire projects, including reasonable ranges on expenditures for projects of varying size. We estimate that the NPS saved several hundreds of thousands of taxpayer dollars by screening wasteful or inefficient projects. In the future we hope to assist agencies and publics by contributing to better understanding of the scope and magnitude of wildfire problems throughout the US, so that efforts can focus on high-risk areas. We hope to do this by developing models and action plans that mitigate threats before fires occur in these high-risk areas.

Conclusions

Ultimately solutions to wildfire management problems will require a coalition of diverse interests working toward solutions at the local levels. Scientists, environmentalists, businesses, and local leaders will need to reach consensus on necessary combinations of treatments that will satisfy human needs without compromising clean air mandates and requirements. Stewardship projects that sustain local community employment bases while providing for a cleaner environment certainly deserve additional consideration.

Perhaps the biggest task involves educating the nation's population about the importance of fire and forest management. Fires have burned in north American forests for thousands of years. By contrast, forests have been managed in our fire environments for only a short time period. Many residents have not come to grips with the risks of living with fire, in spite of the evidence that our forests have burned with regularity. If past experience is any indicator, we are learning that we cannot keep fire out of our forests forever. The trick then is to manage the forest so that we can safely endure and learn from fire's consequences. More tolerance will be required for fire in the forest and prescribed smoke in the atmosphere. Revisions in air quality standards may need to be considered--but the largest obstacle may be our own unwillingness to revise how we fulfill human wants and needs from the forest environment.

This concludes my testimony. I will be pleased to answer any questions from subcommittee members.

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