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1/16/98

Background On The Role Of Fire In North America

Introduction

This paper is a discussion of the role of fire in North America and is intended to provide interested readers with additional information on the subject. This paper was developed by members of an EPA sponsored workgroup in response to specific questions raised about the topic in the development of a policy recommendation to EPA.

Periodic forest, grassland, and shrubland fires are part of the natural environment-as natural and vital as rain, snow, or wind.. Evidence of past fires is found in charcoal layers in lakes and bogs, and in the fire-scarred cross sections of trees. Recurring disturbances by fire are essential to the functioning of many ecosystems, termed "fire-dependent," that are found throughout North America (Heinselman 1978). Many examples are available to describe how fire beneficially affects the functioning of ecosystems, such as influencing plant succession and the structure and composition of vegetation, reducing fuel accumulations, insect populations, tree diseases, and increasing nutrient production and cycling, vegetation productivity and diversity, and improving habitats for wildlife. For example, many plants and trees produce seeds that must be cracked in order to germinate such as the Peter's Mountain mallow. Without the natural presence of fire they can become nearly extinct.

The Role of Fire

The role of fire in North American ecosystems has been undergoing change since man began to play a more active role in managing our natural resources. American Indians actively used fire to alter vegetative patterns, to ease travel, or for hunting purposes. Prior to European settlement, five to ten times more wildland fires occurred in the United States than ocurr now. After European settlement large and unregulated herds of cattle and sheep introduced by these settlers overgrazed western forests until there was no longer enough fine fuel, in the form of dry grass, to carry and spread natural fires. These settlers also believed that fire, unlike other natural disturbance phenomena, could and should be controlled. Thus began the practice of fire exclusion and suppression to protect public and private property, and to prevent what was considered the destruction of forests, savannahs, shrublands, and grasslands. The practice of fire exclusion and suppression has continued up to the present with the federal government beginning to take an active coordinated role in the 1930's. From that point on, the number of acres burned by wildland fire on federal and non-federal lands began to decline from a high of just over 50 million in 1930, to a low of under 10 million acres in 1953. The number of acres burned has continued to decline

since 1953, although more slowly and has reached the point where the average since 1987 is roughly 2.1 million acres annually, primarily due to effective suppression techniques.[a]

Consequences of Suppression

Recently, those agencies and individuals who study fire and manage public and private lands have recognized that the policy of wildfire suppression has had unintended negative effects. When forests and grasslands[1] are not allowed to burn naturally (lighting serving as the principle source of ignition), heavy accumulation of dead vegetation, altered fuel arrangement, and changes in vegetative structure and composition can result. When dead fallen material accumulates on the ground it increases fuel quantity and creates a continuous arrangement of fuel, ground fires may ignite more quickly, burn with greater intensity, and spread more rapidly and extensively than in the past.

The arrangement of live vegetation also affects the way fires burn. For example, an increase in the density of small trees creates a multi-storied forest structure with a continuous vertical fuel arrangement. This arrangement may allow a fire normally restricted to the ground to spread up into the trees and become a crown fire. In addition to structural changes, vegetation modification resulting from fire exclusion can cause a shift toward species that are not adapted to fire (some of which are not native) and are therefore more susceptible to damage from fire. For example, forests on the dry, east-facing slopes of Washington and Oregon were originally dominated by big, fire-resistant trees such as ponderosa pine, western larch, and Douglas fir, whose deep bark is a better insulator than asbestos of equal thickness. Historical accounts describe these forests as open, park-like, and supporting luxuriant grasses important to wildlife. But after 70 years of fire suppression, thin-barked species like grand and white fir that used to be kept in check by slow, low-intensity ground fires have proliferated and act as “fire ladders” to the crowns of trees, including old-growth trees. These crown fires burn with greater intensity and heat, spreading much more rapidly through a forest making control and suppression nearly impossible. Such unmanaged wildfires can heat soils so much that for years afterwards, nutrient levels are drastically lowered and the soils actually repel water. This can cause significant adverse watershed and water quality impacts as well as reducing tree regeneration.

Wildfires in areas of altered vegetation and fuels can adversely affect other important forces within the ecosystem such as wildlife populations, hydrologic processes, mineralogy, and nutrient cycling. Any of these components, if altered greatly by unusually severe fire, can seriously diminish the long-term sustainability of the land. Even with aggressive restoration and rehabilitation, it commonly takes years to restore productive forest stands and ecosystems after a wildfire. There are also the issues of safety, both the public’s and firefighter safety, and cost in terms of the destruction of valuable property and suppression, since these large fire events are much more difficult to control and suppress. While the annual average acreage burned by

[a] From a briefing by Jim Douglas, Offie of Managing Risk and Public Safety, U.S. Department of the Interior, April 22, 1997.

wildfire since 1987 is 2.1 million acres, there have been exceptions. Wildfires burned over 4.5 million acres nationally in 1998 including the Yellowstone National Park fire which lasted for 4 months and burned nearly 1 million total acres[2]. In 1996, wildfires burned 6 million acres and cost nearly $1 billion in federal funds to suppress[3]. Even when the wildfire season returns to "normal," the results are severe for example, the 1994 wildfire season resulted in the death of 33 firefighters and cost $1 billion in federal fire-suppression funds[4]. In urban-interface areas where private property is mingled with public wildlands, the threat of the lost of life and property is high. For example, the Nevada County CA, 49er fire of September 1988, burned 33,700 acres and destroyed 312 structures, and the Laguna, CA fire of 1993 burned 14,437 acres and destroyed 441 structures[5]. Other factors to consider related to the threat of increased catastrophic wildfires are the increase in smoke emissions and its corresponding effect on public health, and the impact these emissions also have on visibility, particularly in areas which generally enjoy 100 mile vistas such as some national parks and wilderness areas.

Today, Federal and State land management agencies consider our public forests and other natural preserves "unhealthy" because of the proliferation of unnatural tree species, insect infestations, and dead and dying trees which litter the forest floors and provide excess fuel for catastrophic wildfires. While other techniques such as mechanical removal of dead and dying trees and other debris may reduce fuel loadings, their use is limited due to physical inaccessibility (especially in large areas of the West), the slope of the land, or soil insensitivity. Administrative constraints, such as wilderness or habitat protection, also impose limitations on their use. Perhaps most importantly, other treatment techniques cannot always replace the ecological role that fire plays. Forest health problems appear to be most concentrated in short interval (5-30 years) fire-adapted ecosystems, commonly represented by long-needle pine types. Although fire is an important natural force in a variety of forest, brush, and prairie ecosystems, it may be most critical in the long needle pine types, which occur on nearly 30 percent of National Forest System lands as either the dominant species or in association with other species.[6]

Changes in Fire Management Policy

In 1995, a Federal Wildland Fire Management Policy and Program Review was conducted in response to the unhealthy condition of our public wildlands, and the increase in unplanned fires that occurred in 1988 and 1994. As a result of this review, the five principal Federal fire/land management agencies (the Forest Service (FS) under the Department of Agriculture and the Bureau of Land Management (BLM), National Park Service (NPS), Fish and Wildlife Service (FWS), and the Bureau of Indian Affairs (BIA) under the Department of Interior agreed on need for several changes to existing fire/land management practices. Their recommendations include the reintroduction of fire (allowing it to play its natural role) into federal land management programs in "an ongoing and systematic manner, consistent with public health and environmental quality considerations[7]." The goals of this change in land management policy are to reduce unnatural fuel densities that contribute to increasing unplanned fire hazards, and to restore wildland ecosystems to their healthy natural states. The use of wildland fire to accomplish land and resource management objectives is referred to as prescribed fire, the deliberate application of

fire to wildlands to achieve specific resource management goals. The Federal agencies previously mentioned plan to increase the use of prescribed fire in their most vulnerable wildlands (see the section on Definitions for a detailed description of this term) beginning in 1997. Annual treatment targets will be increased to a projected 3 million acres a year by 2003.

The most vulnerable areas of the country in terms of fuels build-up will be treated first with a variety of pre-treatment activities such as mechanical removal of fuels (where possible), thinning, and salvage logging. This is done to make it safe to treat the area with planned controlled fire, otherwise with the current excess of fuels present on the forest floor, a planned burn would be very difficult to control and could escape. In other areas where the fuel build-up is not as severe but where ecosystem needs must be addressed, planned fire can be introduced without pre-treatment. The number of acres of State managed public lands where planned fire is used may be increased in future years, but not to the extent expected on federal lands. The increase on private lands is expected to be even smaller.

REFERENCES

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4. "Only You Can Postpone Forest Fires," Sierra, Volume 80, Number 4, July/August, 1995.

5. "In the Line of Fire," Ambassador, The Magazine of Trans World Airlines and Trans World Express, July, 1996.

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