

# Applying Stand Replacement Prescribed Fire in Alaska

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Stand replacement prescribed burning has been applied in Alaska on several occasions. Based on that experience, perspectives can be provided, issues can be discussed, and keys to success can be identified that are applicable to stand replacement prescribed burning activities in areas outside Alaska.

There are approximately 220 million fire-prone acres in Alaska. Suppression of wildfires on a widespread basis has been effective only within the past 40 years. Between 1982 and 1984, Interagency Fire Management Plans were implemented that are still in effect. The intent of these plans was to reduce suppression costs, and to allow land managers greater latitude in making suppression decisions that were consistent with resource management objectives. The plans provide for a range of suppression responses, from aggressive suppression of fires threatening life and property to surveillance of fires in remote areas that do not threaten areas requiring protection. Approximately 65 percent of the fire-prone acreage on State and Federal lands in Alaska is in a "surveillance suppression" response category.

Although not a widely used practice in Alaska, prescribed burning has been utilized as a hazard reduction and resource management tool by the Bureau of Land Management, National Park Service, Fish and Wildlife Service, USDA Forest Service, and State of Alaska.

## Background on Alaska

Summer in the taiga zone of the boreal forest ecosystem in Alaska is characterized by a short growing season and long daylight hours. Cold soils with discontinuous areas of permafrost and low decomposition rates are prevalent. Fire and flooding are major forces shaping the ecosystem and the vegetation mosaics in the taiga zone. Historic fire intervals are commonly 60-200 years. Stands of black spruce (*Picea mariana*) are common on poorly drained sites and stands of white spruce (*P. glauca*) are common on better drained sites. Birch (*Betula* spp.) and aspen (*Populus tremuloides*) are abundant in early to mid-successional stages of forest development. Alder (*Alnus* spp.), willow (*Salix* spp.) and ericaceous shrubs (heath) are common in the understory with a moss layer and lichens on the forest floor. Many forest stands in the taiga zone have limited or no commercial value. Wildlife, recreation, and subsistence resources for native peoples are often primary resource values.

In: Hardy, Colin C.; Arno, Stephen F., eds. 1996. The use of fire in forest restoration. Gen. Tech. Rep. INT-GTR-341. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

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Precipitation is less than 15 inches a year, and in many areas is under 10 inches a year. Because of the low rainfall and frequent presence of frozen soils, spruce in the taiga zone are often moisture-stressed. Dead branches, especially in black spruce, commonly remain on the tree and extend to the ground. Consequently, even fires of lower intensity can torch out or climb into the canopy. Fire behavior in black spruce is characterized by a slow rate of spread with relatively high intensity. Short range spotting is common. The primary carrier of fire is the surface fuels. During extended dry periods, white spruce stands will burn with characteristics similar to black spruce.

## Perspectives on the Use of Fire

The USDI Fish and Wildlife Service utilizes fire as a resource management tool on National Wildlife Refuges throughout the United States. The National Wildlife Refuge system in Alaska encompasses 16 refuges and 77 million acres. The Tetlin National Wildlife Refuge, at 724,000 acres, and the Kenai National Wildlife Refuge, at 1.7 million acres, are the only two road-accessible refuges in Alaska (fig. 1). A refuge management purpose common to both refuges is "to conserve fish and wildlife populations and habitats in their natural diversity." In Alaska, fire often plays an important role in supporting this purpose. Both Tetlin and Kenai refuges have stand replacement prescribed burn plans in place. In terms of planning and implementation of those burns, there are significant differences between the two refuges.

### Tetlin

The Tetlin National Wildlife Refuge is relatively remote, and is located in the eastern interior of Alaska. Less than 3,000 people live within a 50 mile radius of the refuge. Although public use is high along the highway corridor on the north side of the refuge, public use is relatively low on portions of the refuge away from the highway. In part because of the frequent occurrence of large lightning-caused fires in interior Alaska and adjacent Canada, the public attitude towards smoke from forest fires is very tolerant. The only local news media is a bimonthly newspaper. The prescription latitude for burning on the Tetlin National Wildlife Refuge is relatively wide, with long dry periods common. There are routinely one to several potential windows of opportunity to accomplish prescribed burns in a given season.

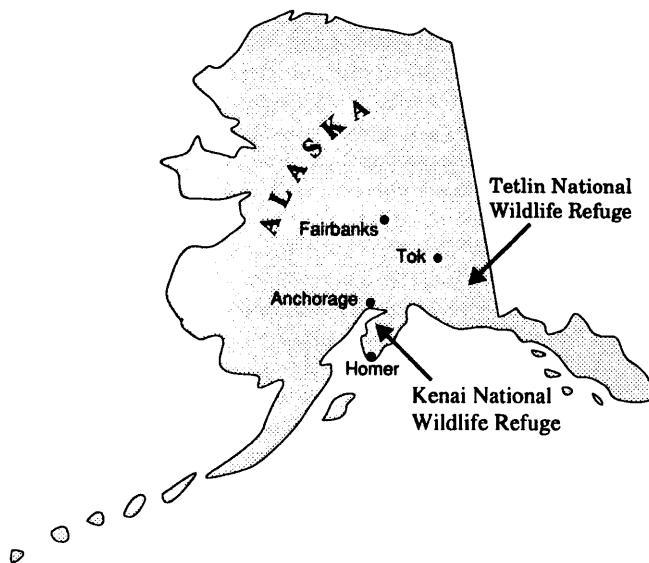


Figure 1—Two National Wildlife Refuges in Alaska.

## Kenai

The Kenai National Wildlife Refuge is located near the southcentral coast of Alaska on the Kenai Peninsula. In contrast to Tetlin, it is a premier recreation destination for tourists, with high public use. More than 300,000 people live within a 50 mile radius of the refuge, including the city of Anchorage. Lightning-caused fires and large fires occur infrequently on the Kenai Peninsula, and the public is very intolerant to the appearance and impacts of smoke. News media within 50 miles of the refuge include numerous radio stations, TV stations, and newspapers. The prescription window for burning on the Kenai National Wildlife Refuge is relatively narrow. Humidities are higher on average than in interior Alaska because of the marine influence. Smoke management constraints include a restriction on burning on weekends, minimum ventilation factors, and restrictions on smoke transport direction. Recreational uses late in the season have priority over prescribed burning. As a result, there may only be a single opportunity or no opportunity to accomplish prescribed burns in a given season.

## Prescribed Burning Accomplishments

On the Tetlin National Wildlife Refuge, a 5,800 acre stand replacement prescribed burn was accomplished in 1993. Goals were twofold: to enhance the vegetation mosaic and vegetative diversity and to provide for the collection of research data on fuel consumption and fire behavior. Ignition was accomplished entirely by air, using a PREMO aerial ignition device dispenser. Natural barriers were used for containment lines, and no holding crews or holding action were required after ignition. The cost was less than \$1.50 per acre.

On the Kenai National Wildlife Refuge, the 7,000 acre Mystery Creek Burn has been planned for the past five years, but has not been implemented. Goals of this burn are:

to enhance habitat conditions for wildlife and to provide a fuel break adjacent to a forest of beetle-killed white spruce. Planned ignition method is by helicopter (using a helitorch), with some follow-up ignition on the ground using drip torches. An existing road, gasoline right-of-way, and constructed control lines will be used for containment. Line holding action and mop up will be required on the ground to insure containment. Costs are anticipated to be relatively high—between \$5.00 and \$35.00 per acre. A determinant in the variability in cost is whether weather and fuel conditions allow the entire unit to be burned in one or two burning periods, versus execution of several smaller burns over an extended time frame.

Stand replacement prescribed burning in Alaska has the potential to become more prevalent. The state of Alaska currently has three stand replacement prescribed burns in various stages of planning. There are additional stand replacement burns planned at both the Tetlin National Wildlife Refuge and the Kenai National Wildlife Refuge.

## Issues

There are several issues that could affect the ability to implement stand replacement burns in Alaska. The first issue is cost. Stand replacement burns in many cases are expensive to implement. Funding uncertainties have increased in this era of shrinking budgets and downsizing. At the same time, suppression costs in many areas are spiraling upward. While landscape scale prescribed burning can be expensive up front, burning at landscape scale does help to reduce the per acre cost. Furthermore, it has the potential to save money in the long run by improving forest health and by creating mosaics which can help reduce the threats, and expense of, suppressing catastrophic fires.

Smoke management is an issue that is becoming increasingly important. Currently, quality regulations in Alaska in general are not very restrictive with regard to prescribed burning. However, Alaska is on the verge of implementing air quality regulations which establish an emission fee of \$5.07 per ton of assessable emissions. There is still a question on applicability to open burning of vegetation. If emission fees are assessed, it will greatly increase the costs of landscape scale prescribed burning, and could adversely impact implementation of plans. The 1993 prescribed fire on the Tetlin National Wildlife Refuge provides a good case in point. Fuel consumption on that project was determined to be 20.3 tons per acre, or 117,740 tons for the 5,800 acre burn (Ottmar, personal communication). An estimated 1,766 tons of particulate would be produced from the fire for an assessed emission fee of \$8,954 (Hardy, personal communication)—an emission factor of 30 lb/ton was used for this estimate. This emission fee would double the cost of burning—increasing the base cost of \$1.50 per acre to over \$3.00 per acre. Safety is another issue. Stand replacement burning over longer time frames and on a larger scale can increase risks of something going wrong, particularly with regard to unforeseen weather events. Safety of personnel implementing burns and the safety and protection of the public cannot be compromised.

Federal policy mandates land manager responsibility to insure that sufficient contingency suppression forces are

available on a daily basis when a prescribed fire is burning. With a decreasing national pool of suppression personnel, increasing suppression demands nationally, and increased interregional movement of suppression personnel to meet the national needs, it becomes more difficult and complicated to insure availability of contingency forces. This situation is exacerbated by the multiple burning-period timeframe of landscape scale burning projects. It is not usually financially feasible to insure personnel availability by paying for standby firefighters prior to development of a need for suppression action.

## Keys to Success

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Despite the obstacles, stand replacement prescribed burning can be successful. Keys to success include planning, public education, interagency cooperation, and research.

Good planning is essential. Risks must be identified and mitigated, burn objectives must be established that can be reasonably attained, contingency planning must be addressed, and safety must be emphasized.

Public education is important. If the public is not supportive, it becomes exceedingly difficult to execute landscape scale prescribed burning. Public support cannot be developed overnight. A concerted effort must be made to garner public support through outreach to the schools and the media and through public involvement in the planning process.

The USDI Fish and Wildlife Service has had success implementing a school curriculum on the "Role of Fire in Alaska." If the public is informed of and involved in the planning process, they are more likely to become stakeholders in the outcome and thus to support the action taken. Media coverage of prescribed fire activities should be encouraged; it is an invaluable opportunity for land managers to highlight and publicize burn objectives, the role of fire in the ecosystem, and the agency's fire management program in general.

Interagency cooperation and support is necessary to successfully accomplish landscape scale stand replacement prescribed burning. Incentives for cooperation include the increasing focus on ecosystem management by various agencies, the limited contingency suppression forces available from any one agency, and the increasingly sophisticated training and experience required for using prescribed fire. Agreements need to be in place to allow the sharing of local and regional fire control equipment and forces from various agencies. There may be opportunities to reduce project costs by utilizing aircraft with low contract rates from other agencies and also if cooperating agencies absorb some of the costs of resources they provide. Invaluable experience which can benefit fire management programs for each agency involved can be obtained and shared by assigning personnel between agencies.

Research is another important facet of successfully implementing landscape scale prescribed burning. With the inherent risks of using fire as a tool, managers need to be able

to effectively explain and defend their actions to an often skeptical public. Research is needed in many areas to clarify the role of fire in the ecosystem. Research projects must be designed that put useful information in the hands of resource managers to ease decisionmaking, planning, and attainment of desired effects and to increase public support.

The success of the stand replacement prescribed burning noted on the Tetlin National Wildlife Refuge was aided by several factors. The burn plan was smoothly implemented. Media coverage was encouraged, newspaper articles were written before and after the burn, and a television station reporter was allowed access to the operation. Other agencies that cooperated with the USDI Fish and Wildlife Service on the project were the USDI Bureau of Land Management and the State of Alaska. Research scientists from both the Intermountain and Pacific Northwest Research Stations, USDA Forest Service, collected data on fuel consumption and effects of heat on organic soils that are part of two national research projects.

## Conclusions

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In conclusion, the USDI Fish and Wildlife Service has had successes and failures in implementing stand replacement prescribed burning in Alaska. Due to the remote location of much of the public lands and to the successful implementation of interagency fire management plans that provide for a range of suppression responses in Alaska, there is little need for widespread application of stand replacement prescribed burning. However, the continued exclusion of fire from private lands and their adjacent public lands, and the difficulty and risks associated with implementing prescribed burning of any type in those areas are sources of increasing concern.

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