PRESCRIBED NATURAL FIRE IN ALASKA: POSSIBILITIES AND COMPLEXITIES

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ABSTRACT

In Alaska, fire is one of the more important factors structuring the boreal forest. From the late 1950's until the early 1980's, aggressive initial attack was taken on all fires throughout Alaska whenever suppression resources were available. In effect, this created a full suppression policy. In 1982 the Alaska Interagency Fire Management Council was instrumental in coordinating the development of an Alaska Interagency Fire Management Plan (AIFMP). Today in Alaska, because of the AIFMP, wildland fire protection is accomplished by defining lands in critical, full, limited or modified fire protection categories. While this approach to managing fire in Alaska is widely viewed as an improvement over the full suppression policies of the past, there is concern that the AIFMP does not go far enough within the realm of professional fire management. This paper addresses the issue of the current AIFMP's potential for indirectly sustaining healthy ecosystems and biodiversity on the designated limited and modified lands, while considering the potential application of prescribed natural fire to achieve specific resource management objectives. To be successful, a substantial increase in the use of manager-ignited prescribed fire will be needed on lands presently designated in full and critical categories. Concurrently, Alaska must maintain state-of-the-art fire suppression capabilities that adopt minimal impact suppression tactics and strategies.

Citation: Roessler, James S. 1998. Prescribed natural fire in Alaska: possibilities and complexities. Pages 390–396 *in* Teresa L. Pruden and Leonard A. Brennan (eds.). Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tall Timbers Research Station, Tallahassee, FL.

INTRODUCTION

Organized fire suppression in Alaska began on July 1, 1939 with the creation of the Alaska Fire Control Service (Pyne 1982, Robinson 1960). From the 1950's through the early 1980's, when suppression resources were available, aggressive initial attack was taken on all fires throughout Alaska. During 1982, the Alaska Interagency Fire Management Council (AIFMC) ushered in a new era in fire planning with the completion of the Tanana-Minchumina Fire Plan. Today, wildland fire protection under this plan is achieved by placing lands in either critical, full, limited, or modified categories. The placement is based on the presence of human habitation and/or use levels, private property, the value of natural resources, and comparing these to the cost effectiveness and environmental consequences of suppression actions. The critical protection option is specifically created to give the highest priority to suppression action on wildland fires that threaten human life, inhabited property, designated physical developments, and/or structural resources designated on the National Historic Landmarks. Full protection option was established for the protection of cultural and historical sites, uninhabited private property, high-value natural resource areas, and other high-value property. Limited protection option recognizes areas where the cost of suppression may exceed the value of the resources to be protected, the environmental impacts of fire suppression activities may have more negative impacts on the resources than the effects of the fire, or the exclusion of fire may be detrimental to the fire-dependent ecosystem. Site-specific areas that warrant higher levels of protection may occur within limited protection areas. Appropriate suppression actions to protect these sites will be taken when warranted, without compromising the intent of the limited protection area. Modified protection option is the most flexible option available to land managers and owners. The intent of the modified protection option is to provide a higher level of protection during extended daylight periods when fire growth is enhanced and probability of containment is reduced. This option may reduce commitment of suppression resources when risks are low.

The Interagency Fire Management Plans were defined as "best examples" of the coordination and cooperation needed to successfully manage ecosystems in Alaska (Gallagher and Epps 1989). Fire protection responsibility in Alaska varies according to land ownership patterns (Tables 1 and 2). The landowner or manager determines which category of fire protection is desired for their lands. The plans are updated annually with most changes involving lands transferred into the limited level from the modified and/or full protection levels. Close to 50% of lands in Alaska are placed in the limited protection level (Table 2).

Fire protection strategies vary from aggressive initial attack with continued suppression efforts in the critical and full protection areas to surveillance in the limited protection areas. The Alaska Interagency Fire Management Plan (AIFMP) that was revised in 1991 set the following priorities: (1) that human life, private property, and certain valued resources are to receive the fullest protection possible with the available firefighting resources; (2) the cost of suppression effort is to be commensurate with values-at-risk; and (3) in predetermined areas, where values do not warrant ag-

Table 1. 1996 Alaska land ownership and protection: 1996 acreage figures in millions.

Land owner	Total acreage/ hectares	BLM-AFS protected	State of Alaska protected	USFS protected
BLM	87.0 (ac) 35.2 (ha)	67.0 (ac) 27.1 (ha)	20.0 (ac) 8.1 (ac)	
USFWS	77.0 (ac) 31.2 (ha)	36.0 (ac) 14.6 (ha)	41.0 (ac) 16.6 (ha)	
NPS	52.0 (ac) 21.0 (ha)	27.0 (ac) 10.9 (ha)	25.0 (ac) 10.1 (ha)	
NATIVE CORP	36.2 (ac) 14.6 (ha)	17.1 (ac) 6.9 (ha)	18.0 (ac) 7.3 (ha)	1.1 (ac) 0.4 (ha)
NATIVE ALLOTMENTS	1.2 (ac) 0.5 (ha)	0.5 (ac) 0.2 (ha)	0.7 (ac) 0.3 (ha)	
MILITARY	2.1 (ac) 0.8 (ha)	2.1 (ac) 0.8 (ha)		
FEDERAL SUBTOTAL	255.5 (ac) 103.4 (ha)	149.7 (ac) 60.6 (ha)	104.7 (ac) 42.4 (ha)	1.1 (ac) 0.4 (ha)
STATE	88.0 (ac) 35.6 (ha)	31.3 (ac) 12.7 (ha)	56.7 (ac) 22.9 (ha)	
PRIVATE	1.0 (ac) 0.4 (ha)	0.1 (ac) 0.04 (ha)	0.9 (ac) 0.4 (ha)	
USFS	23.0 (ac) 9.3 (ha)			23.0 (ac) 9.3 (ha)
TOTAL	367.5 (ac) 148.7 (ha)	181.1 (ac) 73.3 (ha)	162.3 (ac) 65.7 (ha)	24.1 (ac) 9.8 (ha)

gressive suppression actions, fire can maintain biodiversity and productivity of the northern boreal forest and tundra ecosystems. Values that warrant protection are permitted structures, archeological sites, predetermined timber resources, and other sites identified by land managers and owners.

The 1991 AIFMP revision carefully pointed out that "naturally occurring wildfires are a necessary part of the boreal forest and arctic tundra ecosystems, and the exclusion of fire is neither ecologically nor economically wise." The AIFMP emphasized that "the natural role of fire in the environment must be balanced by the need to protect human life and health, private property, human-made developments and certain valued, natural and cultural resources."

Fire is allowed to maintain biodiversity and productivity of the northern boreal forest and tundra ecosystem except in predetermined areas where some protection from fire is desired. Some people think wildfires are being used improperly to achieve resource management objectives. Until recently, federal policy clearly stated that "wildfire *will not* be used to achieve resource management objectives." The 1996 Federal Fire Policy has changed this policy. Now wildland fire, defined as any fire on wildlands, can be used to achieve management objectives. Haggstrom (1994) believes "wildland fire is often the cheapest and most effective way to maintain or restore the natural ability of the forest to sustain an abundance of wildlife and meet people's needs." He believes that land and fire managers simply cannot afford to let proper stewardship of fire-dependent ecosystems be incidental to decisions based solely on cost-effective suppression. Haggstrom (1994) concludes "in Alaska, for most everyone except wildlife biologists, the impetus for fire management planning was to reduce suppression costs."

Mutch (1993) states, as an outsider looking in, "I have long debated in my mind whether Alaska's fire policies (critical, full, modified, and limited suppression responses) are an expression of an advanced evo-

Table 2. Wildland fire protection areas in Alaska.

Level	BLM-AFS Protection	DNR-DOF Protection	USFS Protection	Extra	Grand Total	Percent
Critical	254,303 ac 102,914 ha	1,756,803 ac 710,961 ha	180,483 ac 73,040 ha	54 ac 22 ha	2,191,643 ac 886,936 ha	0.59%
Full	18,345,315 ac 7,424,166 ha	41,505,697 ac 16,796,941 ha	2,952,031 ac 1,194,657 ha	103,847 ac 42,025 ha	62,906,890 ac 25,457,789 ha	16.99%
Modified	35,366,777 ac 14,312,581 ha	32,247,612 ac 13,050,286 ha	4,827,899 ac 1,953,802 ha	163,232 ac 66,058 ha	72,605,520 ac 29,382,727 ha	19.16%
Limited	88,609,569 ac 35,859,406 ha	74,362,437 ac 30,093,735 ha	14,114,423 ac 5,711,966 ha	19,029 ac 7,701 ha	177,105,458 ac 71,672,808 ha	47.84%
Hot Zone*	219,285 ac 88,742 ha	211 ac 85 ha	0	0	219,496 ac 88,828 ha	0.06%
Water	0	1,792,639 ac 725,463 ha	192,126 ac 77,751 ha	9 ac 4 ha	1,984,774 ac 803,218 ha	0.54%
Not Rated**	48,749,023 ac 19,728,242 ha	30,890 ac 12,501 ha	4,438,527 ac 1,796,227 ha	8,411 ac 3,404 ha	53,226,851 ac 21,540,374 ha	14.54%
Total	191,544,272 ac 77,516,051 ha	151,696,289 ac 61,389,971 ha	26,705,489 ac 10,807,444 ha	294,582 ac 19,214 ha	370,240,632 ac 149,832,681 ha	
Percent	51.74%	40.97%	7.21%	.08%		

This table was produced form 1996 ARC/INFO coverages FIREPROTS (fire protection boundaries) and PROT3D (fire protection levels). These numbers are depicted in the 1996 Wildland Fire Protection Levels map.

* Military Hot Zones are restricted areas, no entry allowed because of possible live munitions, monitor fires, no suppression action taken on the ground.

** Blocks of land in "Not Rated" include the North Slope (46,750,000 acres or 18,919,258 hectares) and Venetie Reserve (1,800,000 acres or 728,442 hectares). Venetie Reserve is presently treated as full protection area. "Extra" are mainly slivers of unaccounted land due to the files not overlaying each other exactly.

(Information courtesy of State of Alaska Department of Natural Resources Forestry).

lutionary state and the rest of the U.S. has not yet caught up, or are the policies an artifact of a long history of fire suppression that are due for additional evolution and revision to keep pace with some of the demands to sustain healthy ecosystems through an integrated program of wildfire suppression and prescribed fire implementation on a landscape scale." Mutch concludes that the present fire planning in Alaska does not go far enough since no decision matrix accounts for prescribed natural fire (PNF). Prescribed natural fire is defined as "naturally ignited wildland fire that burns under specified conditions where the fire is confined to a predetermined area and produces the fire behavior and fire characteristics to attain planned fire treatment and resource management objectives" (NWCG 1996).

This paper addresses the issues brought forth by Haggstrom (1994) and Mutch (1993). The purpose is not to solve the issues but to shed light and provide thoughts for discussion and debate so that future decision-makers can move forward in keeping fire in the ecosystems of Alaska.

EFFECTS OF FIRE SUPPRESSION ON NATURAL DIVERSITY

Fire is an ecosystem process (Viereck 1983) that has been interacting with vegetation at least since the Miocene (30 million years before present) or early Pliocene (12 million years before present) when the members of modern forest assemblages evolved (Hopkins 1967).

Fire is one of the major natural forces impacting the structure of the boreal forest in Alaska. The ecology of the forest is shaped by fire and fire as such has a regular presence on the boreal landscape (Shugart et al. 1992). Natural landscapes in Alaska that are subject to disturbance, such as fire, have a patchy appearance that changes when humans intentionally alter disturbance size or frequency (Baker 1992). A person needs only to look at color aerial photography of interior Alaska or fly over the landscape to see this mosaic of forest stands throughout a given area. Much of this mosaic is a direct result of fires on the landscape. Had these historic fires not occurred in these landscapes, there would be a more homogenous or different forest or vegetation cover type from what we see today.

Two types of fire periodicity can be established for a unit of land. "Fire frequency" is the probability of an element burning per unit time. "Fire cycle" is the time required to burn an area equal in size to the study area (Johnson 1992). These definitions imply that some sites will be burned more often than other sites in a given area. Because fire periodicity and severity are major influences on vegetation structure, composition, productivity, and many other ecosystem processes, it is surprising that very little information is available on fire cycles in Alaska. Yarie (1981) investigated the natural fire cycle in the Porcupine River drainage of interior Alaska. He estimated the natural fire cycle to be 43 years for the entire study area and based this estimate on ages of 375 randomly located stands in the 3.6 million hectare Porcupine River area. He also determined the fire cycle for individual forest types, which is 113 years for white spruce and 36 years for black spruce.

Baker (1993) studied the multi-scale response of landscapes to fire suppression. One of his findings indicated that it is unclear how spatio-temporal patterns in disturbance landscapes are affected by external intentional fire suppression. There is little doubt that fire suppression does affect landscapes. However, the spatially heterogeneous character of the response of the landscape to fire suppression makes it difficult to definitively attribute certain vegetation changes to fire suppression. The only real evidence that fire suppression has caused a landscape change is to provide evidence that an ignition was suppressed in that part of a landscape (Baker 1993).

In most parts of Alaska, natural-caused and many human-caused ignitions cannot be prevented. Only the spread of a fire can be reduced. In the limited protection level areas of Alaska an ignition must occur before there can be a suppression effect at a particular location on the landscape. In limited protection areas, fires are allowed to burn in most cases. However, in the critical and full protection level areas, and during certain periods of time in moderate protection level areas, fires are attacked. The portion of these landscapes directly affected by suppression is the area that would have burned if the fire had not been suppressed.

Fire spread models such as BEHAVE (Burgan and Rothermel 1984) or the Canadian Fire Behavior Prediction System (Lawson et al. 1985) can be used to estimate the area that would have burned if fire had been allowed to burn and thus estimate the area affected by suppression. To use the models, accurate weather information for the specific area is needed for the estimated burn duration.

A number of land, wildlife, and fire managers believe the present AIFMP will meet Alaska's needs in fire planning indefinitely. Their premise is the limited protection areas are receiving "natural" fire and no further planning or work is needed. They state "fire is fire" and there is no justification for prescribed natural fire. However, Whelan (1995) writes, "it is now well accepted, that one fire is not necessarily like another with respect to its impact on the biota." He goes on to claim that "one fire can have a negligible effect on the community within which it occurs, whereas another that is perhaps less severe in human perception can alter community structure markedly."

Shrader-Frechette and McCoy (1993) claim ecology cannot tell us what is "natural." Natural is often defined as "a condition in existence before the activities of humans perturbed the system." They believe this definition of natural is flawed, both because it excludes humans, a key part of nature, and because there are probably no fully natural environments or ecosystems anywhere.

Ratz (1995) studied long-term spatial patterns created by fire in boreal forests in relation to the fire regime of an area. A fire regime is described by variables including the frequency, size, annual area burned, and intensity of fires (Heinselman 1973, Tande 1979). Ratz concluded that fire clearly shapes the vegetation of an area, but the vegetation also shapes the fire by controlling the flammability and finally the spread of the fire. Vegetative mosaics resulting over large areas when fires periodically flared up, ran, and dropped back to the ground in responses to changes in weather, topography, and fuel are vital to the ecologic integrity and biodiversity of most wildland ecosystems. Aggressive fire suppression alters this shaping of vegetation and ultimately the vegetation's impact on future fires. A black spruce dominated ecosystem is a case in point.

As black spruce ecosystems mature they are believed to become colder and wetter and permafrost develops (Viereck 1973). These factors affect the moisture percent in the ecosystem and with increasing age of the stand help to decrease the chance of ignition by lightning. Yarie's (1981) data indicated that these factors decrease the chance of burning until about 80 years, after which, only additional minor decreases in probability of burning occur. The overall effect found in the Porcupine River drainage is that with fire exclusion, one might expect a drastic decrease in vegetative productivity as the area enters late successional stages.

Perhaps the most significant impact of successful fire suppression efforts in Alaska has been the large reduction of the easy-to-suppress, slow spreading, low-intensity fires in the tundra and boreal forests. This suppression impact occurs in critical, full, and occasionally modified fire protection areas. Prior to 1982, all fires were aggressively attacked provided suppression forces (namely aircraft and personnel) were available.

PRESCRIBED NATURAL FIRE IN ALASKA—POSSIBILITIES AND COMPLEXITIES

While the goal of the AIFMP is "to provide an opportunity, through cooperative planning, for land managers/owner(s) within the state to accomplish their fire-related, land-use objectives in the most cost-efficient manner, consistent with agency policies," there are no scientific prescription parameters which address specific land management objectives. Maintenance or improvement of natural diversity, or preservation of natural processes, can result from meeting the primary objective of saving suppression dollars while keeping fire in the ecosystem. Christensen (1989) implies that the simplest and most naive strategy to accomplish or maintain a natural fire regime would simply be to "let it be" and assume that the resulting pattern of disturbance is natural. He notes, however, that no judicious manager would accept liability for such a policy. Furthermore he questions, given the extent of human activity on and alteration of most landscapes, whether it is realistic to believe that such a policy would necessarily restore natural fire cycles.

Bonnicksen (1989) strongly questions Federal Fire Policies that do not incorporate scientific management into their strategies. Bonnicksen stresses the point "the type of management that ignores science today, relieves agencies of the responsibility of dealing with the complexity of biotic communities and of distinguishing between success and failure in fire management policies." Chase (1986) emphasizes accountability in land management decisions. He stresses that management not grounded in science leads to inefficiency and probable failure.

Whelan (1995) clearly states "the main objectives of land management, in a particular area, in relation to fire must be articulated carefully, because they will determine the sort of ecological knowledge that is required and the sort of concerns which should be held."

Knight (1991) supports taking a passive or semi-passive approach to wildland management. On the surface AIFMP's fit this approach. Knight believes passive management strategies have merit because "exercising active management with precise goals preempts the opportunity to learn about ecological phenomena that have occurred for millennia." He believes that wildlands that involve large areas may be managed passively. Alaska's vast landscapes fit this description. However, in 1927 Leopold wrote a letter to the Superintendent of Glacier National Park and stated "it seems to me academic to talk about maintaining the balance of nature. The balance of nature in any strict sense has been upset long ago, and there is no such thing to maintain. The only option we have is to create a new balance objectively determined upon for each area in accordance with the intended use of that area." (Chase 1986).

Today with fixed-wing aircraft and all-terrain vehicle access, are human ignitions adding to the frequency of fires in limited management areas? Are land areas sometimes limited by burning too frequently in Alaska? Time between consecutive fires, or fire frequency, can have a marked impact on vegetation, independent of the fire intensity (Whelan 1995). I believe some Alaska land managers have been discouraged in the past that too many hectares within a limited protection area have burned in one season. Planning and implementing PNF in Alaska is a method to improve fire management application and provide answers to future land managers. The current AIFMP does not allow or force managers to increase their knowledge base in fire effects.

DISCUSSION

A move to rethink the role of fire, especially prescribed natural fire in Alaska, is partially a result of the federal sector defining terms and issuing regulations. Wildfires defined by Department of Interior, Departmental Manual, (DM 910-1 1990) are, "any free-burning and unwanted fire requiring a suppression action." Prescribed natural fire (PNF) as defined by NWCG (1996) "is naturally ignited wildland fire that burns under specified conditions where the fire is confined to a predetermined area and produces the fire behavior and fire characteristics to attain planned fire treatment and resource management objectives." PNF is a fire for which ignition is a result of an act of God or (if allowed by agency policy) unauthorized human activity (Fischer 1984). In the past, wildfire could not be used to meet land manager resource management objectives (DM 910–1 1990). Allowing wildfires to burn for resource management objectives and then having these same fires damage private property or threaten human life leaves agencies or government, private sector, and manager (decision-maker) open to litigation.

The Final Report of the Federal Wildland Fire Management Policy and Program Review (1996) is completed and will allow United States Department of Agriculture, Forest Service, and agencies in the Department of the Interior flexibility and departure from the more stringent fire policies of the past. Unfortunately, this report lacks a glossary resulting in unclear terms. Proposed federal policy states "wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role." The Final Report emphasizes, "planning should consider all wildland fires, regardless of ignition source, as opportunities to meet management objectives." This clearly is a change from past policy. Does this change in policy contradict the goal to manage wildlands based on scientific knowledge while presenting clear policies and objectives to the public? This creates confusion within fire and land management agencies, let alone the public we serve. Whelan (1995) provides that the term *bushfires* of Australia is "probably equivalent to the term *wildland fire* that is commonly used in North America." These generic terms describe fires in natural vegetation. They typically describe fires that were not planned, but were started by arson, accident, or lightning and subsequently burn out-of-control. The Society of American Foresters (SAF) Glossary of Fire Management Terms (1990) defines wildland fires synonymous with wildfire. Wildfire is defined by the SAF Glossary as "any fire occurring on wildland that is not meeting management objectives and thus requires a suppression response." Vagueness of terms such as wildland fire as used in the Final Report of the Federal Wildland Fire Management Policy and Program Review (1996) must be clearly stated and defined. Shrader-Frechette and McCoy (1993) provide an excellent explanation in relation to the benefit of an "explicit" definition. They provide insight as to why people may use vague terms, "so that their usage could not be scrutinized too closely and subjected to criticism." Though apparently this was not the case with the Fire Policy Review authors, it is important to be cognizant of the benefit of explicit definitions.

Is there a place for prescribed natural fire in Alaska? Are fire managers, land managers (state, federal, native) and other resource specialists willing to express new ideas? Are they willing and prepared to stand up to questions and challenges? Are they committed to the learning effort: open to ideas of others; the reading; the participation in short courses? Is there a willingness to manage wildland ecosystems in harmony with ecological principles? I believe these challenges can be met. The success of all phases of fire management in Alaska rests, in large part, on being able to document and demonstrate on the ground, the role of fire in achieving land management objectives.

Land managers and fire management planners should decide what kind of vegetation and associated wildlife is to be maintained, enhanced, or discouraged in their planning areas. Fire planners or fire management specialists must work with interdisciplinary specialists to determine the kinds of fires and fire frequencies that will produce the desired vegetation and pattern. This will require developing specific fire management objectives based on land and resource management objectives. We must increase our knowledge in the physical and biological characteristics of the planning area, the probable ecological effects of fires and the absence of fires, and the likely effects of different fire suppression actions on the environment. Whelan (1995) identifies the importance of attempting to quantify fire characteristics and impacts on flora and fauna in ecological studies. These studies are drastically needed.

The use of prescribed fire is complicated by legitimate concerns of wildland fire on landscapes. Examples of such complications include public safety, protection of private property, boundary considerations, endangered species protection, visitor safety, and habitat management. These non-vegetation related considerations and constraints usually result in compromise that does not yield the ecologically ideal results. However, the ideal natural processes should be described as a basis or reference point for wildland fire management for the given area in question.

To successfully allow prescribed natural fire on land areas, competence in forecasting or predicting drought or severe drought periods is essential in both the short term (within reason) and in the long term. The prediction of drought must be coupled with forecasting weather conditions and how these affect the likelihood of ignition of the fuel. Then, in many cases, aggressive fire suppression may be justified. Fire managers must keep up with and support appropriate and essential research at universities and federal research stations. For example, knowledge of temperature trends in relation to timing, length, and intensity of the solar cycle may be useful to fire managers (Juday 1993).

British Columbia was subdivided into biogeoclimatic units: zones, subzones, and ultimately biogeocoenoses (Meidinger and Pojar 1991). This ecosystematic approach provides an ecological framework for making resource management decisions including prescribed fire. Packee (1994) initiated a similar approach for Alaska, which should allow placement of previously described plant communities (Viereck et al. 1992), as well as communities not yet described, into a framework similar to that of British Columbia. Fire managers must stay aware of such research and provide support in terms of funding and personnel. Fire managers must also allow scientists access and opportunities to work on planned and ongoing projects on the lands for which they are responsible.

CONCLUSIONS

The most aggressive fire control programs that Alaska landscapes experienced in the past had notable failures. When fuel, weather, and topography conditions were favorable for extreme fire behavior and spread, aggressive fire suppression measures were ineffective. Fire control in Alaska has existed for less than 50 years, a timespan well within the natural fire-free interval of many vegetation types in Alaska. Will the present fire policies in Alaska cause change to the natural fire regime in the future? Yes, change will most likely occur in the full and modified corridors.

Is biodiversity in Alaska less threatened today than during the total fire suppression period of the 1950's through 1982? Based on current information, probably. The present operating fire suppression plans implementing the options of critical, full, modified, or limited suppression levels are much better for natural diversity than those of the days of full suppression. At least the limited, and in some cases the modified lands, are having fire processes occur. Is this the best fire strategy for Alaska or is there opportunity for evolution to include a prescribed natural fire strategy? I do not think Alaska will maintain the present policies indefinitely. There is a time for change and hopefully improvement in the way fire management is applied to ecosystems in Alaska. In fact, the original AIFMP recommends further study and refinement in fire planning as specific land and resource management objectives are identified.

Should we or can we proceed in developing a PNF program at the same speed and immediate statewide coverage as the present AIFMP was accomplished? I would say, no. Critical information is lacking. Prescribed natural fires should begin with contiguous landownership initially, e.g., a Bureau of Land Management unit, National Wildlife Refuge, National Park, or a large block of Native corporation land. Ideally the goal is to manage for PNF across agency boundaries, and work with adjacent landowners to sustain and enhance healthy ecosystems and provide a solid base for natural diversity within the landscape. Land managers will need to plan and implement manager-ignited prescribed fire to achieve land management objectives in areas of human populations and improvements, currently the critical and full protection lands.

An important part of successfully accomplishing the goals of sustaining and enhancing healthy ecosystems and biodiversity is the involvement of science. Objectively classifying ecosystems, including the flora and fauna, and addressing their species richness, functions, and structure is essential to understanding the biodiversity of local and regional areas. Then the study and monitoring of how fires affect individual plants, plant populations, and soils must be carried out on a community specific basis. Research and application in the causal connection between the behavior of fire and its ecological consequences are needed. Fire history studies that extend the knowledge of fire dates and history prior to Caucasian settlement influence are needed. The involvement of the biological, social, political and economic sciences is necessary. In order to be successful with PNF in Alaska, land managers/owners/planners must work together as they did during the planning of the AIFMP's.

Any new plan such as PNF will require the support of professional and technical personnel from many different disciplines. The involvement and support of the public is necessary. Finally, for PNF to be successful, it is paramount that Alaska maintains state-of-the-art fire suppression capabilities that adopt minimal impact suppression tactics and strategies.

ACKNOWLEDGMENTS

I wish to thank Dr. Edmond C. Packee, Associate Professor of Forest Management at the University of Alaska Fairbanks and Ann Normandeau, a Speech Language Pathologist in private practice in Fairbanks, Alaska for their critical review of this paper. The comments by Melanie Miller, Fire Ecologist with the U.S. Department of the Interior, Bureau of Land Management, National Interagency Fire Center and the anonymous reviewer were greatly appreciated.

I thank Scott Billing, Manager of U.S. Department of Interior, Bureau of Land Management (BLM)-Alaska Fire Service (AFS) and Dave Dash, Division Chief of BLM-AFS Fire Operations for allowing me the opportunity to submit this paper to Tall Timbers Fire Ecology Conference No. 20. Any opinions expressed in this paper are mine and do not necessarily reflect the views of the Bureau of Land Management.

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