Wildland Fire Use: A Wilderness Perspective on Fuel Management

Carol Miller[1]

Abstract—*Current federal wildland fire policy recognizes wildland fire as an important natural process and emphasizes the need to reintroduce fire into ecosystems. The policy also recognizes that hazardous fuel accumulations may need to be reduced on vast acreages of land before fire can safely be returned to wildland ecosystems. Wildland fire and fuel managers have a variety of options for reducing fuels including wildland fire use, management-ignited prescribed fires, thinning, and other mechanical methods. All of these options will need to be exploited to accomplish the task of reducing hazardous fuels and restoring healthy fire-dependent ecosystems. Wildland fire use, while focusing primarily on restoring fire as a natural process and maintaining ecosystems, has the potential to be very effective for managing fuels. It may be the most appropriate strategy in wilderness and in other remote unroaded areas. To effectively implement wildland fire use, wildland fire managers will need to rely on comprehensive fire management plans. The development of these plans should include analyses needed to support the wildland fire use decision and should consider the potential benefits from wildland fire, long-term consequences of management decisions, and impacts of decisions across large landscapes.*

Introduction

Decades of effective fire suppression and land use change have led to fuel accumulations, escalating fire behavior and spread, increased risk to human life and property, and the deterioration of fire dependent ecosystems. The Federal Wildland Fire Policy Report of 1995 declares, "Wildland fire, as a critical natural process, must be reintroduced into the ecosystem." The policy also recognizes that hazardous fuel accumulations may need to be reduced before fire can be reintroduced. The magnitude of the hazardous fuel problem is substantial. It is estimated that fire regimes on over half the land under federal ownership (230 million acres) have been moderately or significantly altered from their historical range (Rocky Mountain Research Station 1999). These lands are therefore at moderate or high risk of losing key ecosystem components and may require moderate or high levels of restoration treatment. In addition to these at-risk lands, there are areas where healthy ecosystems already exist, and treatments may be required to maintain their condition.

A wide spectrum of strategies is available for reducing accumulated fuels and their associated risks including naturally or accidentally ignited wildland fires, management ignited prescribed fires, and a variety of mechanical and chemical methods (Omi 1996). The effectiveness and cost of different fuel treatments depends on a variety of factors including: location, fuel type, size of treatment unit, treatment method, and institutional factors (Rideout and Omi 1995, Schuster et al. 1997, Cleaves and Haines 1997, Cleaves et al. 1999, Gonzalez-Caban 1997). From local to national levels, managers and

[1]Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA Forest Service, Missoula, MT.

planners are seeking to maximize the effectiveness of fuel management programs while controlling costs. In FY2001, USDA and USDI treated 2.25 million acres for hazardous fuel reduction (USDA and USDI 2002). Although the goal for FY2002 is somewhat higher (2.4 million acres), this is only a small fraction of the total acreage in need of treatment. A variety of factors can limit the acres that are treated, including funding, inadequate staffing, lack of experienced and skilled personnel, unsuitable weather, and technological limitations (Barrett et al. 2000, Cleaves et al. 2000, Miller and Landres, in prep.).

The task of reducing hazardous fuels and restoring or maintaining healthy fire-dependent ecosystems is enormous. Despite the impressive commitment to hazardous fuel reduction being made at the national level (USDA and USDI 2002), available resources and opportunities to use prescribed fire and mechanical methods will always be limited. Wildland fire and fuel managers will need to employ all available options and opportunities for reducing fuels. One such option is the use of naturally ignited wildland fire, or wildland fire use (WFU). This paper provides a brief historical context for WFU and discusses WFU as a potentially effective method for fuel management.

Wildland Fire Use in Wilderness

When the Secretaries of Interior and Agriculture issued the Federal Wildland Fire Management Policy and Program Review in 1995, they provided policy direction for all federal wildland fire activities (USDA and USDI 1995). One of the guiding principles of the new policy is that "the role of wildland fire as an essential ecological process will be incorporated into the planning process." The current direction provides for allowing fires from natural ignition sources to be managed for resource benefits if an approved fire management plan is in place (Zimmerman and Bunnell 1998).

The use of naturally ignited wildland fires to achieve resource objectives on federal lands began in the 1970s. At that time, these fires were called Prescribed Natural Fires (PNFs); with the policy change in 1995 came the new terminology of Wildland Fire Use (WFU). Since the early 1970s when policies were first implemented to use natural ignitions, well over 1 million acres have been allowed to burn by either PNF or WFU on National Park Service and Forest Service lands (S. Botti, USDI National Park Service, unpub. data; D. Bunnell, USDA Forest Service, unpub. data). As of 2001, 85 of the 403 FS wildernesses (excluding Alaska) have fire management plans that allow for the use of wildland fire.

The vast majority of PNFs and WFU have occurred within federally designated wilderness or national parks. The Wilderness Act of 1964 defines wilderness as "an area where the earth and its community of life are untrammeled by man," and "which is protected and managed so as to preserve its natural conditions." Wilderness is to be managed so that it "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable." Consistent with this language and with the current understanding of fire's role in natural ecosystems, the wilderness policies of all four federal wilderness management agencies (NPS, USFS, FWS, BLM) recognize the importance of fire as a natural ecological process and the desirability of restoring the historical role of fire to wilderness ecosystems (Parsons and Landres 1998).

Suppression of lightning ignitions clearly does not allow the forces of nature to affect wilderness and therefore runs counter to the intent of the Wilderness Act. However, fire suppression has been and continues to be the dominant fire management strategy. Indeed, in many areas suppression has resulted in conditions where the "imprint of man's work" is quite noticeable as large-scale successional changes and unprecedented fuel accumulations (e.g., Arno et al. 1997, Covington and Moore 1994, Parsons and DeBenedetti 1979). Most of the fires suppressed in wilderness are suppressed because there is no fire management plan that allows for WFU. Currently, only about one in five wilderness areas have fire management plans that allow the use of natural ignitions (Parsons 2000). Even in those wildernesses where the fire management plan allows for WFU, the majority of lightning ignitions are suppressed. For instance, the Bob Marshall Wilderness Complex is a large wilderness area in western Montana with a PNF / WFU program. Between 1988-1998, 80% of the lightning ignitions in the wilderness area were suppressed (Parsons 2000). Wilderness fires are suppressed for a variety of reasons: the potential for the fire to escape the wilderness boundary and threaten values outside of the wilderness; overextended staff and resources; the national or regional fire situation; air quality concerns; and a complex set of political risks (Poncin 1995, Miller and Landres, in prep.).

Wildland Fire Use for Fuel Management

In addition to its ability to help restore the natural process of fire and its ecological role in wildland ecosystems, WFU has the potential to be an effective strategy for accomplishing fuel management objectives. The federal wildland fire policy supports the use of wildland fire as a fuel treatment alternative (USDA and USDI 1995). Wildland fire reduces fuels through consumption, and interrupts fuel continuity by creating vertical and horizontal gaps within and between surface fuels and crown fuels (Brown and Smith 2000). Although the ability of prescribed fire and mechanical treatments to mitigate wildfire behavior and severity has been demonstrated (Pollet and Omi 2002, Omi and Martinson 2002), the effectiveness of WFU as a fuel treatment has not yet been formally assessed. However, many examples exist where fire behavior appears to be affected when the fire spreads into a previously burned area. For example, the area burned in 1996 by the Swet Fire in the Bitterroot NF appears to have inhibited fire spread in 2000, and in Glacier NP, the Moose Fire of 2001 burned around the area of the Anaconda Fire of 1999. These and other anecdotal examples suggest that the mosaic created from abutting burned areas of different ages can aid in tactical fire suppression and reduce the probability of fire escaping to lands with high values-at-risk (van Wagtendonk 1995, Mohr and Both 1996).

In the 105 million acres of federally designated wilderness as well as on other unroaded lands outside wilderness, WFU may be the most feasible option for reducing fuels. Reduced access to the interiors of these areas limits the ability to apply prescribed fire, thinning, and other mechanical methods for fuel management. Further, these more manipulative fuel treatment methods may be inappropriate for use in designated wilderness where their use is limited by current legal and policy constraints, as well as public acceptance (Ingalsbee 2001, Landres et al. 2001).

Planning for Wildland Fire Use

Wildland fire use is only an option if an approved fire management plan allows it (Zimmerman and Bunnell 1998). The fire management plan should provide the information needed to support the WFU decision and should contain comprehensive analyses of the resource and public values that may be affected by fire. Given the time-critical nature of the WFU decision, it is essential that these analyses be done prior to the fire incident. The fire management plan can serve as the instrument of this pre-analysis. To support the WFU decision, this pre-analysis should consider the following:

1. *Wildland fire benefits and risks.* When deciding whether to manage an ignition as WFU, the wildland fire manager needs to assess the benefits of fire use along with its risks. For example, fire's ecological benefits and its ability to reduce hazardous fuels must be weighed against the potential threats it poses to human life and property. The decision to suppress a fire is made when the potential negative consequences from fire outweigh its potential benefits. Conversely, the WFU decision is justified when the potential benefits outweigh the risks. The fire management plan can serve a valuable role in the WFU decision-making process by providing the wildland fire manager with the information needed to make a balanced assessment of the risks and benefits from wildland fire (Miller et al. 2000).

2. *Long term consequences.* The beneficial effects of wildland fire are often realized over much longer time scales than the negative impacts from fire. Landscape mosaics created by fire may be able to reduce the likelihood of property loss in the wildland urban interface but may also require many years of successful WFU implementation. In contrast, the social impacts from fire can occur immediately after, or even during, the fire. In evaluating an ignition for WFU, the wildland fire manager needs to understand the long- and short-term consequences of both WFU and continued fire suppression. A fire management plan could be prepared using the results of ecosystem simulation models that project future conditions. This information would allow the manager to compare the long-term consequences of his / her alternatives.

3. *Landscape scales.* Fire is a process that operates at large spatial scales and fire management activities affect entire landscapes. Implementing WFU in the interior of a large wilderness area may adversely impact air quality far outside the wilderness boundary. Decisions to suppress ignitions that start outside the wilderness boundary can affect the fire regime in the interior of the wilderness by preventing the natural immigration of fires spreading into the wilderness. To consider an ignition for WFU, a wildland fire manager needs to evaluate the potential impacts on a variety of values across a broad geographic area. If developed in conjunction with a Geographic Information System (GIS), the fire management plan can be used to organize and display information about the social, economic, cultural and ecological values that may be affected by fire management activities. In addition, the fire management plan could contain up-to-date information about fuels and the biophysical environment that affects fire spread—information that can be fed directly into fire behavior prediction tools (Finney 1994).

These three aspects of the pre-analysis (fire benefits, long-term perspectives, and landscape scales) will be essential for supporting a WFU decision. In addition, they could also help link the fire management plan to the land and resource management plan. A key element of the land management planning process is the identification of desired future conditions, and the potential benefits from WFU could help define these conditions. A long-term, landscape scale perspective is consistent with land and resource management planning, which is based on the principles of long-term sustainability and cross-boundary integration (Committee of Scientists 1999). Ideally, the land management plan would provide the goals and objectives for the fire management plan and these objectives could be framed in terms of long-term desired future conditions across the management area. To complete the linkage from the fire management plan back to the land management plan, the success of the fire management program should be evaluated in terms of these land management objectives. For example, the performance of a fire management program might be measured in terms of social impacts or desired future conditions that have been identified in the land management plan (Rideout and Botti 2002).

Summary

The task of reducing hazardous fuels and their associated risks on federal lands is enormous. To accomplish this task, wildland fire and fuel managers will need to utilize the full spectrum of fuel management strategies, including wildland fire use (WFU). WFU has the potential to be very effective for managing fuels and is likely the most appropriate strategy in wilderness and in other remote unroaded areas. The decision to manage an ignition for WFU will hinge on the analyses contained in the fire management plan. To adequately support the WFU decision, these analyses need to consider benefits from wildland fire, long-term consequences, and landscape scales.

References

Arno, S.F., Smith, H.Y. and Krebs, M.A. 1997. Old growth ponderosa pine and western larch stand structures: influences of pre-1900 fires and fire exclusion. Res. Pap. INT-RP-495. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 20 p.

Barrett, T.M., Jones, J.G., and Wakimoto, R.H. 2000. USDA Forest Service use of spatial information in planning prescribed fires. Western Journal of Applied Forestry. 15: 200-207.

Brown, J.K. and Smith, J.K. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-Vol-2. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Cleaves, D.A. and Haines, T.K. 1997. Regulation and liability risk: their influence on the practice and the price tag of prescribed burning. In: Bryan, D. (ed.). Proceedings of the environmental regulation and prescribed fire conference; 1995 March 15-17; Tampa, FL: 165-183.

Cleaves, D.A., Haines, T.K., and Martinez, J. 2000. Influences on prescribed burning activity in the National Forest System. In: Fire and forest ecology: innovative silviculture and vegetation management; proceedings of the 21st Tall Timbers fire ecology conference; 1998 April 14-16; Tallahassee, FL. Tallahassee, FL: Tall Timbers Research Station: 170-177.

Cleaves, D.A., Haines, T.K., and Martinez, J. 1999. Prescribed burning costs: trends and influences in the National Forest System. In: Proceedings of the symposium on fire economics, planning and policy: bottom lines; 1999 April 5-9; San Diego, CA. Gen. Tech. Rep. PSW-GTR-173. Albany CA: U. S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 277-287.

Committee of Scientists. 1999. Sustaining the people's lands - recommendations for stewardship of the National Forests and Grasslands into the next century. [Online]. Available: http: / / www.fs.fed.us / news / science [August 16, 2002]

Covington, W.W. and Moore, M.M. 1994. Southwestern ponderosa forest structure and resource conditions: changes since Euro-American settlement. Journal of Forestry. 92: 39-47.

Finney, M.A. 1994. Modeling the spread and behavior of prescribed natural fires. In: Proceedings of the 12th international conference on fire and forest meteorology; 1993 October 26-28; Jekyll Island, GA. Bethesda, MD: Society of American Foresters: 138-143.

Gonzalez-Caban, A. 1997. Managerial and institutional factors affect prescribed burning costs. Forest Science. 43: 535-543.

Ingalsbee, T. 2001. Wildland fire use in roadless areas: restoring ecosystems and rewilding landscapes. Fire Management Today. 61: 29-32.

Landres, P.B., Brunson, M.W., and Merigliano, L. 2001. Naturalness and wildness: the dilemma and irony of ecological restoration in wilderness. Wild Earth. 10: 77-82.

Miller, C., Landres, P.B. [In preparation]. Information needs for wildland fire and fuels management.

Miller, C., Landres, P.B., and Alaback, P.B. 2000. Evaluating the risks and benefits of wildland fire at landscape scales. In: Neuenschwander, L.F.; Ryan, K.C., tech. coords. Crossing the millennium: integrating spatial technologies and ecological principles for a new age in fire management; proceedings of the joint fire science conference and workshop; 1999 June 15-17; Boise, ID. Boise, ID: University of Idaho: 78-87.

Mohr, F. and Both, B. 1996. Confinement: a suppression response for the future. Fire Management Notes. 56: 17-22.

Omi, P.N. 1996. Landscape level fuel manipulations in greater Yellowstone: opportunities and challenges. In: The ecological implications of fire in Greater Yellowstone; proceedings of the second biennial conference on the Greater Yellowstone ecosystem; 1993 September 19-21; Yellowstone National Park, WY. Fairfield, WA: International Association of Wildland Fire: 7-14.

Omi, P.N. and Martinson, E.J. 2002. Effect of fuels treatment on wildfire severity. Final Report to the Joint Fire Science Program Governing Board. Fort Collins, CO: Western Forest Fire Research Center.

Parsons, D.J. 2000. Restoration of natural fire to United States wilderness areas. In: Watson, Alan E.; Aplet, Greg H.; Hendee, John C., comps. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress Proceedings on Research, Management, and Allocation, vol. II; 1998 October 24-29; Bangalore, India. Proc. RMRS-P-14. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 42-47.

Parsons, D.J. and DeBenedetti, S.H. 1979. Impact of fire suppression on a mixed-conifer forest. Forest Ecology and Management. 2: 21-33.

Parsons, D.J. and Landres, P.B. 1998. Restoring natural fire to wilderness: how are we doing? In: Pruden, Teresa L.; Brennan, Leonard A., eds. Fire in ecosystem management: shifting the paradigm from suppression to prescription, proceedings of the 20th Tall Timbers fire ecology conference; 1996 May 7-10; Boise, ID. Tallahassee, FL: Tall Timbers Research Station: 366-373.

Pollet, J. and Omi, P.N. 2002. Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests. International Journal of Wildland Fire. 11: 1-10.

Poncin, D.E. 1995. Prescribed natural fire strategies and tactics. In: Brown, James K.; Mutch, Robert W.; Spoon, Charles W.; Wakimoto, Ronald H., tech. coords. Proceedings: symposium on fire in wilderness and park management; 1993 March 30-April 1; Missoula, MT. Gen. Tech. Rep. INT-GTR-320. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 133-135.

Rideout, D.B. and Botti, S.J. 2002. Performance-based interagency fire program analysis system: blueprint for fire planning. Journal of Forestry. 100: 36-41.

Rideout, D.B. and Omi, P.N. 1995. Estimating the cost of fuels treatment. Forest Science. 41: 664-674.

Rocky Mountain Research Station. 1999. Coarse-scale spatial data for wildland fire and fuel management. [Online] Available: http://www.fs.fed.us/fire/fuelman [August 16, 2002].

Schuster, E.G., Cleaves, D.A., and Bell, E.F. 1997. Analysis of USDA Forest Service fire-related expenditures, 1970-1995. Res. Pap. PSW-RP-230. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 29 p.

USDA and USDI. 1995. Federal wildland fire policy. [Online] Available: http://www.fs.fed.us/land/wdfire.htm [August 16, 2002].

USDA and USDI. 2002. FY 2001 performance report: National Fire Plan. [Online] Available: http://www.fireplan.gov/fy_2001_performance.cfm [August 16, 2002].

van Wagtendonk, J.W. 1995. Large fires in wilderness areas. In: Brown, James K.; Mutch, Robert W.; Spoon, Charles W.; Wakimoto, Ronald H., tech. coords. Proceedings: symposium on fire in wilderness and park management; 1993 March 30-April 1; Missoula, MT. Gen. Tech. Rep. INT-GTR-320. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 113-116.

Zimmerman, G.T. and Bunnell, D.L. 1998. Wildland and prescribed fire management policy, implementation procedures reference guide. [Online] Available: http://www.fs.fed.us/fire/fire_new/fireuse/wildland_fire_use/ref_guide/refguide.pdf [August 16, 2002].