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The Howling Prescribed Natural Fire – long-term effects on the modernization of planning and implementation of wildland fire management.

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Abstract
Wildland fire management policy and practices have long been driven by the occurrence of significant events. The Howling Prescribed Natural Fire in Glacier National Park in 1994 is a prime example of a significant historical fire event that provided the impetus for program changes and modifications that modernized wildland fire management at the local, regional, and national levels. During the management of this fire in the midst of numerous wildfire suppression complexes, factors such as resource availability, internal and external concerns, and long-term situational awareness became increasingly important. Glacier National Park and National Park Service (NPS) fire management leaders were forced to develop and apply innovative methods to assess the long-term situation, ensure adequate resources were available to manage the fire, put ground-breaking planning and operational activities into practice, and confirm with both internal and external audiences that desired objectives would be achieved. This paper chronicles how the Howling Prescribed Natural Fire framed the development of wildland fire use as a strategic direction, influenced the development of planning and implementation procedures, demonstrated the value of fire presence in vegetation and landscape-scale land management, shaped long-term public opinion, and yielded lasting effects on wildland fire management policy.

Additional keywords: fire policy, wildland fire use, Glacier National Park, fire history.

Introduction

Throughout the history of wildland fire management, program growth and development has not followed a steady course, but has more often been driven by the occurrence of significant events. Such events can occur with positive outcomes that reveal inefficiencies in policy, procedures, and practices or have negative outcomes which bring immediate, focused attention generating program and policy reviews, updates, or changes aimed at minimizing or eliminating any potential reoccurrence of such negative outcomes.

Historically significant wildland fires where objectives were not achieved or where extreme negative outcomes occurred have garnered much attention and observation. These types of events often represent instances of failed planning and implementation actions, or resulted from cascading circumstances yielding undesirable outcomes. Review and attention to these fires frequently become an impetus for major changes. In other cases, fires have been managed in a

manner that, while receiving much less attention, provide examples of situations where desirable outcomes occurred and lessons learned led to improvements in organizational procedures, practices, and policy which markedly strengthened capability, accomplishments, and performance.

The Howling Prescribed Natural Fire in Glacier National Park, Montana, in 1994, is a significant historical event where objectives were successfully accomplished and attention was localized. While the fire was relatively unheard of and did not gain regional or national prominence, it eventually had profound effects on the fire management program at local, regional, and national levels. This fire provided the beginning for multiple changes and modifications to the prescribed natural fire program, influenced subsequent policy reviews and modifications, and established a foundation for efforts that would modernize wildland fire management.

Setting the stage

Wildland fire management policy direction in effect in 1994 originated after the 1988 fire season with implementation beginning in 1989-1990. This policy clearly stated that all fires were either a prescribed fire or a wildfire. Prescribed fires were composed of two types: management ignited prescribed fires and prescribed natural fires (PNF). Prescribed natural fires were in every way, a very subordinate part of the total program, only managed on selected units under Forest Service and NPS jurisdiction, and subject to a number of constraints on implementation. During this time, management of many prescribed natural fires was strongly questioned by groups both internal and external to the agencies. Management of fires was limited by fire activity and resource availability constraints. As a result, managers were often forced to make innovative decisions and put ground-breaking planning and operational activities into practice to realize management opportunities. From such activities it was apparent that the fire management program was not operating at its highest level of efficiency; in fact, by 1994 many instances of policy inflexibility and undue constraints, lack of program adaptability, and incomplete guidance were evident.

Agency direction limited prescribed natural fire implementation to a small number of administrative units with funding allocated to the specific units; emergency fire suppression funds were not allowed to be used for these fires. Consequently, available funding for PNF implementation often limited the number and extent of potential fires, and sometimes, was completely exhausted for a particular unit before the height of the fire season.

Regional and national preparedness levels had been developed, which at the time, also constrained PNF implementation. Specific wording found in preparedness level (PL) 4 (the next to highest level) stated that initiation of new PNF's and management ignited prescribed fires would be suspended. At PL 5 (the highest level), all directions from PL 4 would continue and all PNF's and management ignited prescribed fires would be suppressed with no further implementation or planned ignition. This direction markedly constrained PNF prospects, especially during those periods where ecologically significant fires could occur in fuel or condition limited ecosystems and in higher elevation areas having short windows of opportunity.

Regional and national prioritization procedures also presented limitations to program implementation as all PNF events essentially received by default, a lower priority designation than suppression actions. This resulted in an inability to obtain additional resources beyond what was locally available, and served as cause for frequent decisions to suppress fires. Even in

situations where there were low demands for firefighting resources for suppression actions, the allocated funding scenarios made it extremely difficult to obtain additional resources due to costs and lack of non-reimbursable agreements for management situations, and at times, mobilization of additional resources was not supported due to the lack of interagency funding charge codes.

In 1994, hot, dry conditions developed across much of the northwestern United States creating high early season fire danger. Wildfire activity began sooner than usual and intensified as the summer progressed; by late July, fires were growing quickly in numbers and size. As fire activity escalated, support from other fire management agencies began to waiver, and pressure was given to NPS managers to suppress the Howling PNF. In addition, a wildfire in 1988, the Red Bench Fire, had burned very near to where the Howling PNF was located. Public opinion of PNF was mixed with those in the local area having the Red Bench scenario still fresh in their minds. Additionally, the Little Wolf Fire to the west of Glacier NP was putting up smoke and had the potential to threaten the town of Whitefish. So, as the Howling PNF progressed through the season, NPS managers were faced with a variety of challenges, including increasing internal and external concerns, which threatened successful implementation of the PNF.

The Howling Prescribed Natural Fire story

On June 23, a thunderstorm ignited a fire in the North Fork of the Flathead River area on the west side of Glacier National Park. The park had an approved Fire Management Plan that allowed use of multiple strategies to manage wildland fires and this fire fell within a natural management area. Based on current and short-term weather forecasts and expected fire behavior, managers declared the fire a PNF and prepared a fire situation analysis (FSA), the required NPS planning document for managing prescribed natural fires. Initially, little fire activity was observed, and by August 4, after six weeks of unchecked burning, the fire, named the Howling PNF, had grown to only 1 acre in size.

Despite the small size and minimal fire activity to date, park managers became concerned about managing a potentially large, uncontained fire while fire suppression activity demands were markedly increasing on numerous wildfire complexes, both locally and throughout the northwest. The first of several significant decisions was made when the park superintendent determined that park staff could not make the necessary commitment to the Howling PNF for its duration in light of escalating wildfire activity. He told NPS national office leaders that the current strategy might continue only if an outside organization could be provided to the park for planning and implementation support. This was, at this time, an unusual request. Virtually all previous prescribed natural fire management had been completed by local units with local personnel. It was assumed that administrative units having prepared fire management plans identifying PNF as a management strategy would have the capability and depth to plan and implement all fires within their own organizations.

The park superintendent felt that, without meeting certain conditions, his decision space would narrow and likely be channeled toward suppression. Support in the form of a dedicated incident management team staffed with non-park personnel was requested to establish goals, accomplish detailed planning, provide focused attention to public information, and implement management operations, including close and aggressive monitoring. This request was viewed nationally with some skepticism, but the situation surrounding this fire was recognized as well outside historic experience. The unique nature of this situation and high potential for an ecologically significant management fire where few had occurred represented considerations of

such importance that it was agreed to assemble a dedicated incident management organization to manage the Howling PNF.

A small incident management organization was established with NPS personnel and provided to Glacier NP. During the course of the fire, the team updated the FSA, addressed the current situation, long-term situation, management objectives, values to be protected, special resource concerns, management actions to achieve objectives, and contingency actions. Contingency actions were of special importance because the increasing magnitude of the local, regional, and national fire situation was placing growing demands for firefighting resources elsewhere and making them unavailable for the Howling PNF. As a result, it was necessary for the team to have enough resources on-site to implement all defined contingency actions.

As the summer progressed into August, management of the Howling PNF escalated in scale as additional fires in the same area took on more importance (Fig 1). Several other fires throughout the park were being managed by park personnel. One fire, the Starvation Creek Fire, near the Canadian border, was being suppressed and managed by an organized incident management team. By late August, management of this fire transitioned to the Howling PNF management organization. Two additional fires, the Adair2 and Anaconda Fires, started very near the Howling PNF; these fires were not managed as PNF's, but as wildfires under a confinement strategy because of high potential for elevated costs, damage to park resources, and risks to firefighters. Responsibility for management of these fires was added to the Howling PNF management team. By late September, the Howling, Adair2, and Anaconda fires had burned together, control actions on the Starvation Creek Fire had been completed, and management of this complex of fires transitioned back to the park. The team organization created for the Howling PNF managed it on-site for 75 of the 138 days of its duration as well as having management responsibility for three other fires. Snow fell in late October ending the fire situation. The general location of the Howling PNF and other fires managed by the management team is shown in Fig 1.

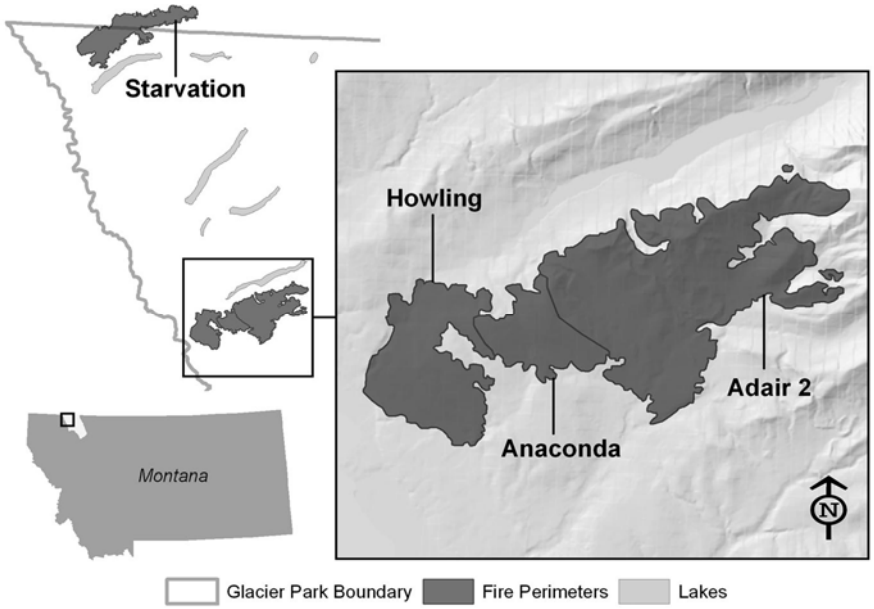

Fig1. Howling PNF – general location, final perimeter, and perimeters of adjacent wildfires.

Impacts of the Howling Prescribed Natural Fire

Decisions and actions implemented during the Howling PNF set the stage for sweeping changes in the wildland fire management program. This fire demonstrated a need for a flexible policy that promotes appropriate management of fire for maximum protection of societal infrastructure as well as the use of fire for ecological objectives, where appropriate. Lessons learned were compiled into recommendations that could improve future management activities for complex, long-duration wildland fires (Zimmerman *et al*. 1995). These recommendations were focused on the PNF program in general but made specific reference to management organizations, program limitations, dedicated PNF resources, and consistent use of risk assessment tools. Nearly all of these recommendations have been implemented; many had immediate effects while others had delayed impacts, but all substantially influenced federal agency wildland fire management policy and continue to do so (Fig 2). These changes advanced overall program effectiveness and modernized fire management (Zimmerman and Lasko 2006, Zimmerman and Sexton 2010). Program areas influenced include: fire policy; establishment of dedicated fire use resources; wildland fire use and long-duration fire planning and implementation procedures; establishment of new positions and qualifications; operational implementation procedures improvement; and definitions and implementation of long-term risk assessment procedures (Fig 2). Many of these changes were the impetus for subsequent policy changes, revised fire review protocols, and updates to operational clarification (Fig 2).

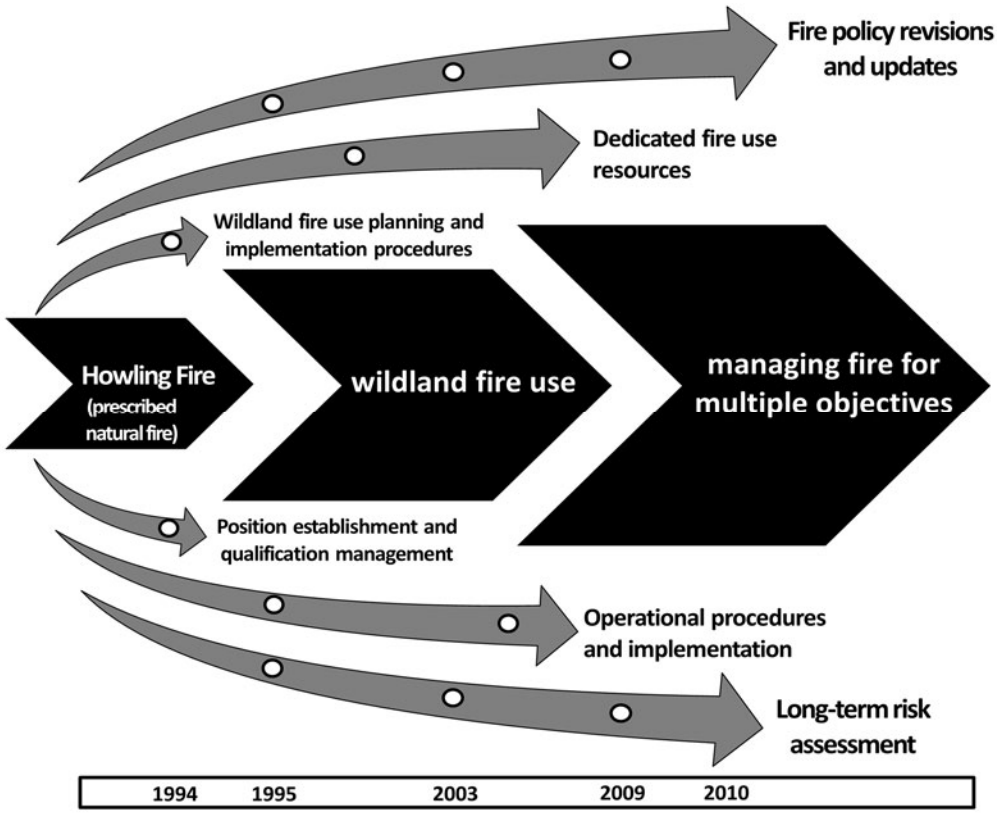

Fig2. Areas of wildland fire management program policy, procedures, and direction influenced by the Howling PNF.

Program policy, procedures, and direction influenced by numerous situations and decisions from the Howling PNF within program areas shown in Fig 2 are described below.

Wildland fire management policy revisions and updates

Following several catastrophic occurrences during suppression actions and organizational inefficiencies associated with managing fire for resource benefits, national leaders recognized current fire policy needed to be updated. A national review took place and resulted in several key policy changes. The 1995 Federal Wildland Fire Management Policy addressed many components of wildland fire program management, but the Howling PNF and others like it served as incentives to develop a more comprehensive wildland fire policy. This policy direction specifically addressed the role of fire as a natural disturbance and moved fire planning toward integration with resource management (Lasko 2010). Prescribed natural fire was eliminated as a fire type and natural wildland ignitions were no longer categorized as part of prescribed fire. All fires were now either wildland fires or prescribed fires. In 2003, another policy review and update broadened fire management program capacity to better balance fire suppression with ecosystem sustainability. Then again in 2009, a policy modification removed the distinction between wildfire and wildfire use.

Lessons learned from the Howling PNF influenced the 1995 policy review, and to some degree, the 2003 and 2009 modifications and updates. Outcomes helped improve understanding that policy must provide flexible and responsive direction, be adaptable, and incorporate emerging knowledge, technology, and science without unnecessary constraints (Zimmerman and Sexton 2010). Specific policy modifications include:

- Improved accountability for long duration fire events managed for resource benefits (1995, 2003, 2009 policy direction).
- Shift from wildfire and prescribed fire to wildland fire (1995 direction).
- Shift from PNF as a strategy to wildland fire use (1995 direction) (van Wagtendonk 2007).
- Wildland fire use eliminated as a separate entity or fire type and consideration of all fires as wildfires (2009 direction)
- Creation of fiscal procedures that facilitated the use of wildland fire for resource benefits (1995 direction).
- Change in preparedness level wording to support better resource allocation and incident prioritization (supplemental direction after 1995).
- Greater advocacy and support for wildland fire use as a strategy for achieving land management objectives (1995, 2003) (Zimmerman and Lasko 2006).

Establishment of dedicated fire use resources

The need for and establishment of formal management organizations to manage complex fire situations in remote areas that require a high level of resource protection and small numbers of resources became increasingly important during the late 1980s and early 1990s. But management capabilities were often confounded by the inability to consistently obtain resources to implement necessary management actions.

Managers of the Howling PNF decided to establish a dedicated management organization with necessary contingency forces to plan and implement operations for this fire. This type of organization, essentially mobile tactical resources, did not formally exist prior to this fire and other options were not usable for this type of situation due to commitments to suppression actions.

Management implications of this decision were increased awareness of the value of having dedicated prescribed fire resources for planning, oversight, and implementation on prescribed natural fires and later, for wildland fire use events. Without pursuing this effort, it is very likely that the Howling PNF would have been suppressed at a small size; but instead this decision created the foundation for establishing organized management teams and small crews which became a major part of wildland fire management and have evolved into the current Wildland Fire Management Teams and Wildland Fire Modules.

NPS developed a Prescribed Fire Management Team program and a Prescribed Fire Module program in 1995. These resources were designed to provide dedicated fire use resources that would not be compromised in availability by fire suppression demands. Four specific Prescribed Fire Management Teams (PFMTs) and four specific Prescribed Fire Use Modules were created. Teams transitioned in name from Prescribed Fire Management Teams to Interagency Fire Use Management Teams and today are either Wildland Fire Management Teams or Type 2 Incident Management Teams. Modules originated as Prescribed Fire Support Crews, then became Prescribed Fire Modules, Fire Use Modules, and are now known as Wildland Fire Modules. Modules currently number 31, generally consist of 6-10 firefighters and are managed by four federal agencies as well as non-federal cooperators.

Wildland fire use and long-duration fire planning and implementation procedures

Prior to 1995, fires in national forests were required to have a Prescribed Natural Fire Burn Plan completed while fires in national parks were required to have a Fire Situation Analysis completed. At this time, no other federal agencies were involved in PNF management. These were two distinct processes for managing PNF's and led to some inefficiency and sometimes, redundancy. It eventually became clear at all management levels that successful application of wildland fire depends on detailed planning from land and resource management plans to fire management plans and the translation of this information into specific implementation action planning and decisions (Zimmerman and Sexton 2010). After the 1994 fire season, the following planning and implementation procedures were adapted:

- Creation of the Wildland Fire Implementation Plan (WFIP) as a single process for use on all wildland fire use events, replacing the Forest Service Prescribed Natural Fire Burn Plan and the NPS' Fire Situation Analysis, and unifying these agencies' planning processes.
- Development of the Wildland and Prescribed Fire Implementation Procedures Reference Guide (1998) and Wildland Fire Use Implementation Procedures Reference Guide (2005) (USDI/USDA 1998, 2005, 2006) which unified wildland fire management agency planning and implementation policies.
- Development and use of the Wildland Fire Decision Support System (WFDSS) to provide the most detailed and comprehensive planning and implementation system for post-ignition fire management decisions. Implementation of WFDSS in 2009 replaced the WFIP and Long-Term Implementation Plan (LTIP) processes (Pence and Zimmerman,2011).

Definitions and implementation of long-term risk assessment procedures

In every wildland fire situation, managers are confronted with uncertainty about the fire situation and potential effects. The need to assess long-range fire conditions to support fire management decision-making and reduce uncertainty has been steadily increasing over several decades and the active fire situation in 1994 strongly reinforced the need for, and value of such

assessments (Mutch 1998, Bradshaw and Andrews 1998).

During the Howling PNF, the local, regional, and national situation combined into a scenario where firefighting resources were scarce, multiple fires were in need of support, and timely decisions had to be made on prioritization and resource allocation. There was a strong belief that the situation was not conducive for management of prescribed natural fires and that all fires should be suppressed. In order to defend the decision to manage the Howling PNF, it was necessary to show that the Glacier NP fire situation, while clearly expected to worsen over the course of the summer, could be managed without adding to the demands for suppression resources.

In response to this need, a variety of decision analysis techniques were employed to acquire and illustrate the long-term situation for the Howling PNF area. Predictions of how the fire could behave were obtained using fire behavior prediction tools (Rothermel 1993). Estimates of the probability of rare fire spread and season ending events were obtained through the Rare Event Risk Assessment Process (RERAP) (Wiitala and Carlton 1993). Relative fire danger conditions and trends in fuel moisture conditions were shown through interpretation of satellite vegetation data (Burgan and Hartford 1993). Long-term fire growth estimates were made using the Fire Area Simulator (FARSITE) model (Finney 1994). This information was provided to decision makers at the local and regional levels and was crucial to decision making that facilitated continued management of the Howling PNF. In addition to providing information to managers, assessment information was useful in communication with the public. In particular, photographs taken from a lookout helped address public concerns over smoke and clarified that much of the local smoke was being produced by wildfires outside the park and not the Howling PNF.

The direct management implications of these efforts for long-term risk assessment clearly illustrated the value of information acquisition and analysis to decision makers. Prior to the modeling and weather analysis there was concern amongst park managers that the Howling Fire could eventually make its way to park headquarters and the West Glacier entrance. Without this modeling and weather analysis support, it is very likely that a completely different decision would have been made. But because decision makers put traditional thinking aside and based their decision on data presented rather than listening to the subjective cries of control-only advocates, the concept of utilizing nature's match to achieve resource benefits under specified conditions originally approved for the USFS Southern Region in 1967 as the Designated Controlled fire (DESCON) concept, for the NPS Sequoia-Kings Canyon NP in 1968, and for the White Cap Wilderness Fire Management Plan in the USFS Northern Region in 1972, was proven a viable policy during a severe fire season. As a result, fire assessment efforts were

completed more frequently after 1994 for a variety of purposes across a range of spatial and temporal scales. Specific risk assessment advances that have followed the Howling PNF include:

- Definitions of fire risk assessments. Rothermel (1998) grouped fire assessments into three principal areas: evaluation of possible growth of large escaped wildland fires, regional fire assessments, and assessment of prescribed natural fires (now categorized as wildfires managed for resource benefits). Zimmerman *et al*. (2000) further defined Rothermel's groupings into: individual fire growth projections, long-term risk assessments, and long-range fire assessments.
- Implementation of Long-Term Risk Assessment procedures. Long-term risk assessments became the staple for long duration fires, provided much greater accountability, reduced uncertainty, and markedly supported decision making. As a result, long-term risk assessments, institutionalized over subsequent years, were/are an integral component of:
    - Wildland Fire Implementation Plan (1998 - 2009) (USDI/USDA 1998, 2005, 2006).
    - Long-Term Implementation Plans (2007 – 2009) for long duration wildfires.
    - Wildland Fire Decision Support System (2009 - ?) (Pence and Zimmerman,2011).
- Implementation of Long-Range Fire Assessments: Long-range fire assessments developed into specific assessments of seasonal severity, seasonal duration, and demands on firefighting resources for large areas, generally on a state or regional scale. These assessments incorporated a variety of analytical techniques and processes to provide reliable information to decision-makers and were used extensively for specific purposes in subsequent years (Hilbruner *et al*. 1998*c*, 1998*b*, 1998*a*; Zimmerman *et al*. 1998).
- Inclusion in training curricula. Long-term risk assessment information was incorporated into multiple regional and national training courses within the national interagency wildland fire management training curriculum. Training courses containing information directly or indirectly stemming from the Howling PNF include:
    - S-491, National Fire Danger Rating System,S-492, Long-Term Risk Assessment,S-493, FARSITE
    - S-495, Geospatial Fire Analysis Interpretation and Application
    - RX-590 Long-Term Fire Behavior Analyst (incorporated into S-590 in 1998),
    - S-590, Advanced Fire Behavior Interpretation,
    - National Park and Wilderness Fire Management Training (NPWFM)(later incorporated into S-580),and
    - S-580, Advanced Wildland Fire Use Applications (later incorporated into S-482, Advanced Fire Management

Applications).

Establishment of new positions and qualifications

In response to a need to define command oversight and support for wildland fire use, several new positions were established and others were modified or expanded in scope. Positions established or revised include:

- Fire Use Manager (FUMA), which later evolved into a multi-complexity position with a Type 1 (FUM1) and Type 2 (FUM2) level available. The 2009 policy direction caused this position to transform into a Strategic Operational Planner (SOPL).
- Fire Effects Monitor (FEMO).
- The Prescribed Fire Behavior Analyst (PFBA, then later, RXBA) transformed into the Long-Term Fire Behavior Analyst (LTAN).

Qualifications for each position and position task books to document experience and currency were created and incorporated into the interagency qualifications system. The training courses above were modified or created to support the positions and provide knowledge, skills, and abilities to trainees.

Operational implementation procedures improvement

The Howling PNF illustrated the disparity in prioritization and resource allocation associated with wildland fire management under the 1989 fire policy. Suppression efforts were supported by cooperative interagency activities and a sophisticated dispatch mobilization system, given consistently high priorities, and provided rapid firefighting support. Conversely, PNF and fire use actions received a consistently low priority classification and did not receive necessary resources, even though time commitments for holding and support resources may have been well-defined, of short duration, and potential benefits of the fire were significant. Numerous operational procedures were modified after 1995 that facilitated more equitable management of wildland fires. These include:

- Regional and national prioritization processes considered all fires based on objectives and situation.
- Reworded preparedness levels placed no restrictions on management of fires.
- Hazard pay entitlement was gained for appropriate wildland fire use events.
- Wildland fire use events became classified as emergency events and were provided specific fiscal codes.

Advancing use of naturally ignited wildland fire to accomplish resource benefits

In Glacier NP, the Howling Fire is a vivid example of how a single event influenced future management decisions and actions and encouraged the active management of future wildland fires for resource benefit. Pre- and post-Howling PNF management fire history clearly show how management activity accelerated after the Howling PNF (Fig 3). This increase occurred on a national scale as well. The transition from PNF to wildland fire use brought

expanded fire management accomplishments (Zimmerman and Sexton 2010) with expansion from a wilderness only program to one that spans all land-use situations (Zimmerman *et al*. 2006).

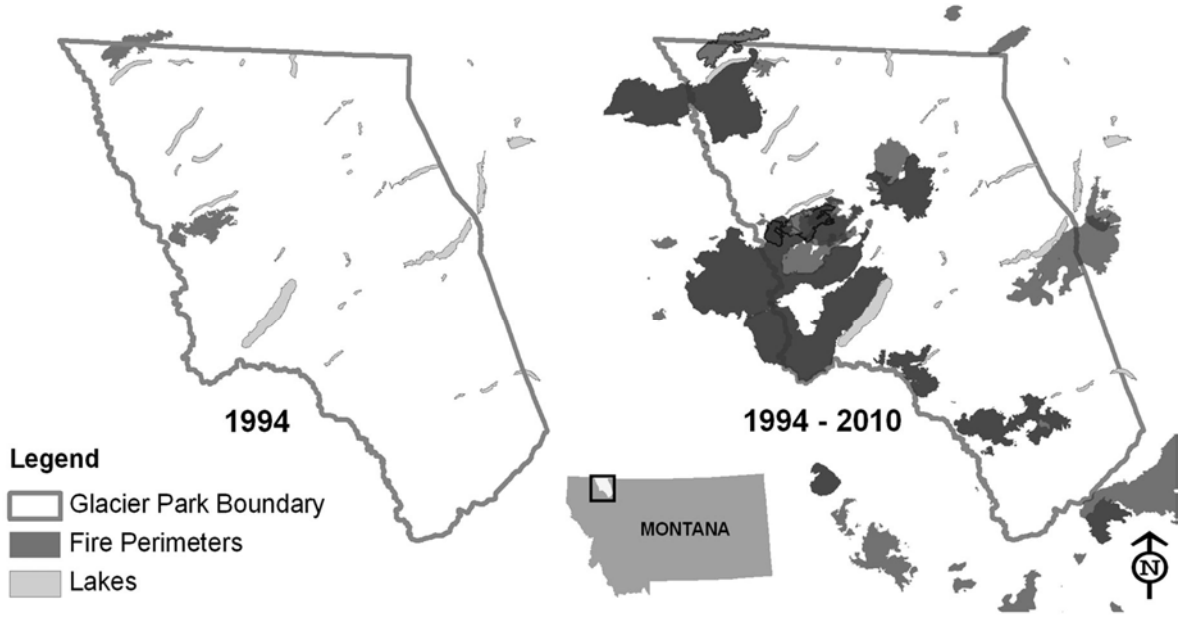

Fig 3. Glacier NP fire history showing PNF fires in 1994 and all long-duration fires from 1994 to 2010.

Summary

Programmatic growth and change in response to lessons learned are critical to improved organizational efficiency. As wildland fire management continues to evolve, management challenges, risks, program complexity, associated demands, and needs to use fire to accomplish beneficial objectives will continue to escalate. The Howling PNF demonstrated the potential to implement management actions for resource benefits and suppression actions simultaneously and manage fires successfully within a wide range of fire danger and fuel moisture conditions; a situation not previously accepted as an option in the range of strategic responses. Fire management leaders were forced to develop and apply innovative methods to assess the long-term situation, ensure adequate resources were available to manage the fire, put ground-breaking planning and operational activities into practice, and confirm with both internal and external audiences that desired objectives would be achieved.

Because of these decisions and actions, this fire is a foremost example of a significant historical event that provided the impetus for substantial fire management program changes. Leveraging lessons learned from these types of events is vital to influencing improvements in

organizational procedures, practices, and policy and ultimately promoting greater organizational efficiency, and strengthened capability, accomplishments, and performance.

The outcomes from the Howling PNF served to modernize wildland fire management at the local, regional, and national levels. Numerous changes to fire policy, planning processes, and risk assessment tools and procedures emerged from management actions, decisions, lessons learned, and successes from the Howling PNF, and set the stage for fire management policy and procedural changes to create a more flexible policy.

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