



Figure 1. The 1994 fire season challenged park staff and cooperators with managing multiple incidents with different goals: the Starvation Creek (upper left) and Adair #2 wildfires (middle right) were contained, while the Howling Fire (middle left) was allowed to burn within prescription to reap ecological benefits.

PRESCRIBED NATURAL FIRE MANAGEMENT: LESSONS LEARNED IN THE GLACIER NATIONAL PARK CLASSROOM

Resource and fire management integration necessary to reap ecological benefits of fire

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The 1994 wildland fire season posed especially long and extensive blazes that challenged many fire managers in the western United States. Numerous fires grew quickly to large sizes and persisted for abnormally long periods of time. Few natural fires were allowed to continue as prescribed natural fires (see the glossary at the end of the article for an explanation of technical fire terms). However, fire managers in Glacier National Park, Montana, successfully managed an early season prescribed natural fire for nearly 15 weeks in conjunction with an above average wildfire workload.

HOWLING FIRE CHRONOLOGY

On June 23, an early season lightning storm ignited a fire in the North Fork area of Glacier National Park near Sullivan Meadow. After initial evaluation and analysis, managers declared the fire a prescribed natural fire and prepared a fire situation analysis and monitoring plan.

Early summer fires are uncommon in the park due to high elevations and typically wet conditions in June. Throughout June and July, the "Howling" Prescribed Natural Fire was monitored daily and showed very little activity. By early August staff mapped the fire at just 1 acre (0.4 ha).

The location and fuels of the Howling Fire, however, gave the fire potential to burn a relatively large area. Fire history in the North Fork area of the park showed that most fires burn from west to east due to the prevailing winds. Only once had a fire crossed to the west over the North Fork of the Flathead River into the Flathead National Forest. Glacier National Park fire managers felt that even though the Howling Fire had potential to become large, the probability of it staying within its anticipated boundaries was high.

The park used the latest fire spread prediction techniques to aid in decision making. A prescribed fire behavior analyst performed a rare event and risk assessment probability, a procedure that provides probabilities of rare weather events affecting fire spread and growth.

The park also used a new computer model, the Fire Area Simulator (FARSITE), to project long-term fire spread. A fire researcher verified, validated, and refined the model using documented cases of fire growth. The combined information aided considerably in the decision making process. However, due to pronounced regional and national fire activity, in-park resources and local fire management cooperators were limited.

On August 5, the fire management staff met with the superintendent to assess fire risks and benefits and to determine how to proceed in managing the Howling Prescribed Natural Fire. The superintendent decided to continue management as a prescribed natural fire; however, he felt that the park needed to meet the following conditions in light of the local and regional wildfire needs:

1. Establish a dedicated incident management team with key positions to be filled by nonpark personnel.
2. Give public information a high priority.
3. Make available as many research opportunities as possible.
4. Establish goals specific to the Howling Fire.
5. Monitor the fire closely and intensively.

By August 8, an incident management team made up of staff from other NPS units was in place. The team updated the fire situation analysis and maximum allowable perimeter (MAP). Initially, the team managed the Howling Fire primarily using park resources, and the park

central fire dispatch office continued to coordinate initial attack on new fires, but that was soon to change.

On August 12, a new fire start (Starvation Creek) required separate management by a type II team. By August 29, most Starvation Creek fire control actions had been completed and operations were turned back over to the park. At this time, the Howling Fire incident management team assumed responsibility for the entire North Fork area of the park (including the Howling Fire) due to resource shortages and the continued need for control actions and initial attack.

Also on August 12, a new fire had been discovered near Adair Ridge within the MAP of the Howling Fire. Due to national and regional preparedness level restrictions, this fire (Adair #2) was not managed as a prescribed natural fire. After taking unsuccessful initial attack actions, the team managed it using a confinement strategy, as potential costs, damage to park resources, and risks to firefighters were all high. On August 29, another fire (Anaconda) was discovered between the Howling and the Adair #2 fires and was also placed in a confinement management strategy.

Through mid-September, the Howling incident management team (now known as the North Fork complex incident management team) had managed a prescribed natural fire, two confinement strategy wildfires (both within the MAP of the Howling Prescribed Natural Fire) and a containment strategy wildfire (in conjunction with British Columbia Forestry in Canada[fig. 1]). On September 23, the park reassumed responsibility for the complex, and by September 25, the Howling, the Anaconda, and the Adair #2 fires had burned together. After an extended dry fall, snow fell on October 24.

MONITORING

One element critical to successful management of the Howling Prescribed Natural Fire was consistent monitoring of weather and fire behavior changes indicative of the fire exceeding the management boundary or threatening ranger stations within the boundary. Initially, fire crept through minuscule pockets of dry needles and the underside of downed logs (fig. 2). As vegetation began to cure in late summer, tracking live fuel moistures was

critical to predict increased fire activity in the understory. A monitor familiar with both the global positioning system and the park GIS mapped the fire perimeter on ground and eventually by air. The Howling Fire demonstrated that experienced monitors with diverse backgrounds are essential to address the myriad of issues that arise.

CULTURAL RESOURCE PROTECTION AND LONG-TERM RESEARCH

Abundant archeological resources in one portion of the fire area required special attention. A struggling community of loggers, farmers, and bootleggers lived in the area from the 1890s-1930s. Although many antiques appear to have been removed, several fine examples of pioneer farm equipment, including a horse drawn plow, a threshing machine, and the remains of two wagons were still present (fig. 3). Prior to a backburn operation, monitors conducted an informal yet thorough survey to map the homestead sites and scattered artifacts. Melted glass, broken bottles, and charred fence posts were evidence of previous fire activity. The survey allowed monitors to actively keep fire away from several features, such as wagon wheels and running boards, which warranted protection. With careful observation and planning, the Howling Prescribed Natural Fire had little, if any effect on the archeological integrity of the area.

Ponderosa pine is of particular ecological interest in the fire area. Minimum ponderosa pine reproduction in the park has been attributed partly to fire suppression. In the Howling Fire area this species is present in stands of similar-aged spruce, fir, and larch trees. Vegetation regeneration, particularly ponderosa pine reproduction, will be measured in long-term

fire effects monitoring plots established during the Howling Prescribed Natural Fire.

MANAGEMENT RECOMMENDATIONS

NPS prescribed natural fire management guidelines can be improved to help parks deal more effectively with complex, long duration prescribed natural fires. First, as in wildfire management, incident management teams are valuable tools in prescribed natural fire management. As *wildfires* escape initial attack, pose signifi-



Figure 2. The Howling Prescribed Natural Fire burned predictably through initially moist, then drier, forest understory for 15 weeks before being doused by late October snows.

Figure 3. Deliberate and thorough monitoring efforts followed by a successful backburn operation preserved several cultural artifacts, including this pre-1930s wagon wheel, while allowing the prescribed natural fire to burn.



cant threats, or have potential to burn for multiple burning periods, parks are directed to seek additional assistance and even encouraged to request incident management team support. It is logical that

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parks should also be encouraged to employ outside assistance and even incident management teams when facing potentially lengthy *prescribed natural fires* and complex management circumstances, such as external influences.

The incident command team used in Glacier last summer to manage the Howling Fire for 75 of its 138 day duration, while helpful, also created a need for complex logistical support. This included providing transportation, food, lodging, and communication support for large numbers of personnel in remote areas. Thorough preplanning is required to provide adequate logistical support. Ensuring monitor and crew safety on the ground and in association with air operations must also be properly planned and implemented. Activating a management organization with strictly nonpark personnel permitted proper attention to these concerns and allowed for efficient and safe prescribed natural fire management.

Second, interagency constraints on the prescribed natural fire program should be changed to permit continued management, even during active fire suppression periods. Current preparedness plans have admirably fulfilled a purpose of guiding long-term fire management accountability. These plans, however, unnecessarily restrict or prohibit prescribed fire activities, particularly when such fires could be most ecologically beneficial. These plans should be changed as they presently limit many parks and wilderness areas to natural fires of only small size, short duration, and little ecological significance. Competition with suppression needs will cause prescribed natural fires to lose or be denied resources for monitoring, holding, and contingency actions. Dedicated prescribed natural fire resources would help alleviate this problem.

Other recommendations include:

1. Developing an incident command system organization and certification program that can be used to manage prescribed natural fires.
2. Hiring and training a dedicated 20 person prescribed fire support crew prior to the 1995 fire season.

TABLE 1. GLOSSARY OF SELECTED FIRE TERMS

Burning Period—That part of each 24-hour period when fires will spread most rapidly.

Complex—Multiple incidents being managed by a single incident management team.

Confine—To restrict the wildfire within determined boundaries, established either prior to, or during the fire. These identified boundaries will confine the fire, with no action being taken on the ground until the fire is out.

Contain—To restrict a wildfire to a defined area, using a combination of natural and constructed barriers that will stop the spread of the fire under the prevailing and forecasted weather conditions, until out.

Control—A wildfire, aggressively fought through the skillful use of personnel, equipment, and aircraft to establish firelines around a fire to halt its spread and to extinguish all hotspots until out.

Incident Command System—Combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure with responsibility for management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

Incident Management Team—A team operating with a common organizational structure, with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident. Incident Command System resources (including teams) are "typed" (classified) according to their qualifications and skills to manage large or complex incidents.

Initial Attack—The control efforts taken by resources that are the first to arrive at the incident.

Maximum Allowable Perimeter—A spatial or geographic area defining the maximum prescribed extent of the fire.

Monitoring—Periodic collection of data regarding a fire such as location, size, weather, behavior, fuels, smoke production, and vegetation. Monitoring is used to document basic information, to detect trends, and to ensure that fire and resource management objectives are met.

Natural Fire—A fire of a natural origin (lightning, volcanic, etc.) that is allowed to burn to accomplish one or more resource management objectives.

Prescribed Natural Fire—Fire that meets management objectives and prescriptions to burn. Includes prescribed natural fire and management ignited prescribed fire.

Prescribed Fire—Fires ignited by natural means (usually lightning) that are permitted to burn under specific environmental conditions, in preplanned locations, with adequate fire management personnel and equipment available to achieve defined objectives.

Project Fire—A fire normally of size or complexity that requires a large organization and possibly several days or weeks to extinguish.

Resources—All personnel and major items of equipment available, or potentially available, for assignment to emergencies. Resources are described by kind and type.

3. Using the FARSITE predictive model for assessing prescribed natural fire potential on all future prescribed natural fires.

SUMMARY

During the Howling Prescribed Natural Fire, NPS managers gained new insights into natural fire management. These experiences have generated procedural change recommendations that will both significantly enhance our ability to successfully administer the prescribed natural fire program and influence changes in program guidelines that will affect all prescribed natural fire managers agencywide.

It is imperative that we continue to learn about prescribed natural fire management and continue to strive for the integration of fire and resource

management. The 1994 fire season and the Howling Fire are excellent examples of how we have dealt with uncertainty, developed strategies for continued management, and continued to improve our abilities to manage natural fire in wildland ecosystems.



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