



**Figure 1** Gunbarrel WFU 7/30/2008

## **Fuel Treatment Effectiveness Report Gunbarrel Wildland Fire Use August 14, 2008**

### **Executive Summary:**

#### *Introduction*

Fire management decision space is significantly increased by leadership vision and commitment to preparation through strategic management actions. The ultimate benefit of ongoing hazard fuel treatments in the North Fork Corridor has now provided managers with the opportunity to manage the Gunbarrel WFU as a fire use event. Forest Fire Staff and District Fire Management Officer assert that without these fuels treatments in place, the Gunbarrel WFU would not have been able to be managed in any way other than through traditional suppression response strategy and tactics.

#### *Background*

- To mitigate risks for wildland fire in this corridor, the district completed plans in 2005 to treat 16,345 acres.
- Beetle infestations, drought, fire suppression, advanced succession stages of forest have resulted in tree mortality of up to 90% in forested stands.
- Gunbarrel WFU was started by lightning July 26, 2008.
- On August 3, 2008, fire moved through and around 2 areas of special use structures. All structures survived with minimal protection efforts.

## *Findings*

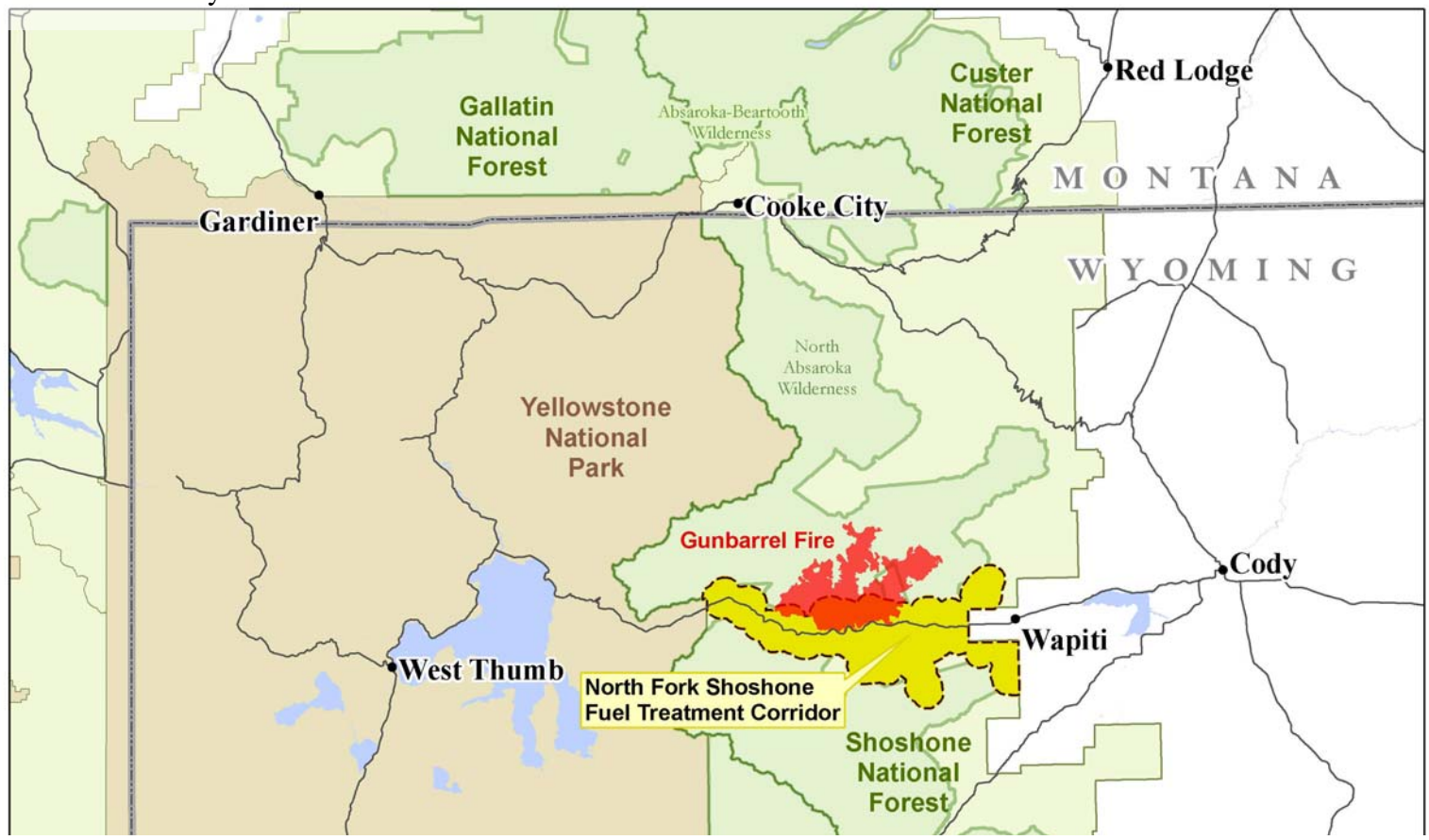
- The ability to manage the fire under Wildland Fire Use provided for:
  1. Increased firefighter safety
  2. Reduced costs
  3. Minimize suppression impact and resource damage
  4. Accomplished resource objectives
- A landscape level approach was used to address the fuels issues in the North Fork Corridor to accomplish successful mitigation of hazard fuels adjacent to values to be protected.
- Comparing the Cascade Fire in Region 1 and the Gunbarrel WFU in Region 2 the benefits of fuel treatment demonstrated:
  1. Decreased exposure for fire personnel
  2. Decreased costs
  3. Decreased impacts of suppression actions on resource values
- Initial vision and investment in landscape scale treatments provides the opportunity of a sustainable maintenance future that is focused on Wildland Fire Use which has a high probability of success.

## **Introduction/Background**

The Wapiti Ranger District of the Shoshone National Forest has identified the North Fork Corridor of the Shoshone River as a focus area for hazard fuel reduction treatments because of high visitation, visitor use, large stands of insect-killed trees, and a recent increase in large wildland fires in that area. The corridor is a gateway community to Yellowstone National Park and attracts an estimated 400,000 visitors each year. To mitigate the risks for wildland fire in this vicinity, in 2005 the district completed plans to treat 16,345 acres in the North Fork area. The project area begins approximately 30 miles west of Cody and ends 55 miles west, near the boundary of Yellowstone National Park, in Park County, Wyoming (see Map 1). These projects are combinations of mechanical and prescribed fire fuel reduction treatments designed to change fire behavior and fire effects along the North Fork corridor and modify fire movement and spotting potential from wildland fire towards developments and improvements (see Figures 2 and 3). Key objectives of the project are:

1. Spacing between tree canopies will become more open; increased space between canopies reduces the spread of wildland fire from one tree to another in crown fires. (40 and 80 square feet of basal area per acre was recommended)
2. Reduced fuel levels that increase the likelihood of protecting property and resource values from substantial losses caused by future fires.
3. Restore wildland fire as a natural disturbance process for remote parts of the North Fork area.

MAP 1 - Vicinity



Beginning in the summer of 2002, forest managers worked closely with the public in the North Fork Corridor to educate them about survivable space as well as gain feedback on proposed treatments in the area. This outreach work included public meetings; media and congressional tours; and field trips with local, regional and national interest groups. There has also been ongoing coordination and implementation of small projects in cooperation with area permittees. Wilderness and RARE II lands make up large portions of the North Fork Shoshone Corridor and were included in proposed treatment areas. Managers worked closely with public interest groups including the Greater Yellowstone Coalition, to ensure preservation of wilderness values while designing an effective treatment.

Many structures and values to be protected from fire in the North Fork Corridor are under special use permit on National Forest lands. There are no private land inholdings within the corridor.

In June 2008, A Decision Notice and Finding of No Significant Impact was issued by the Forest Supervisor to amend the Shoshone National Forest Land and Resource Management Plan (Forest Plan) related to wildland fire management activities. Specifically, managing wildland fire from unplanned ignitions to accomplish resource benefits (wildland fire use) is allowed Forest-wide, when and where conditions are appropriate.

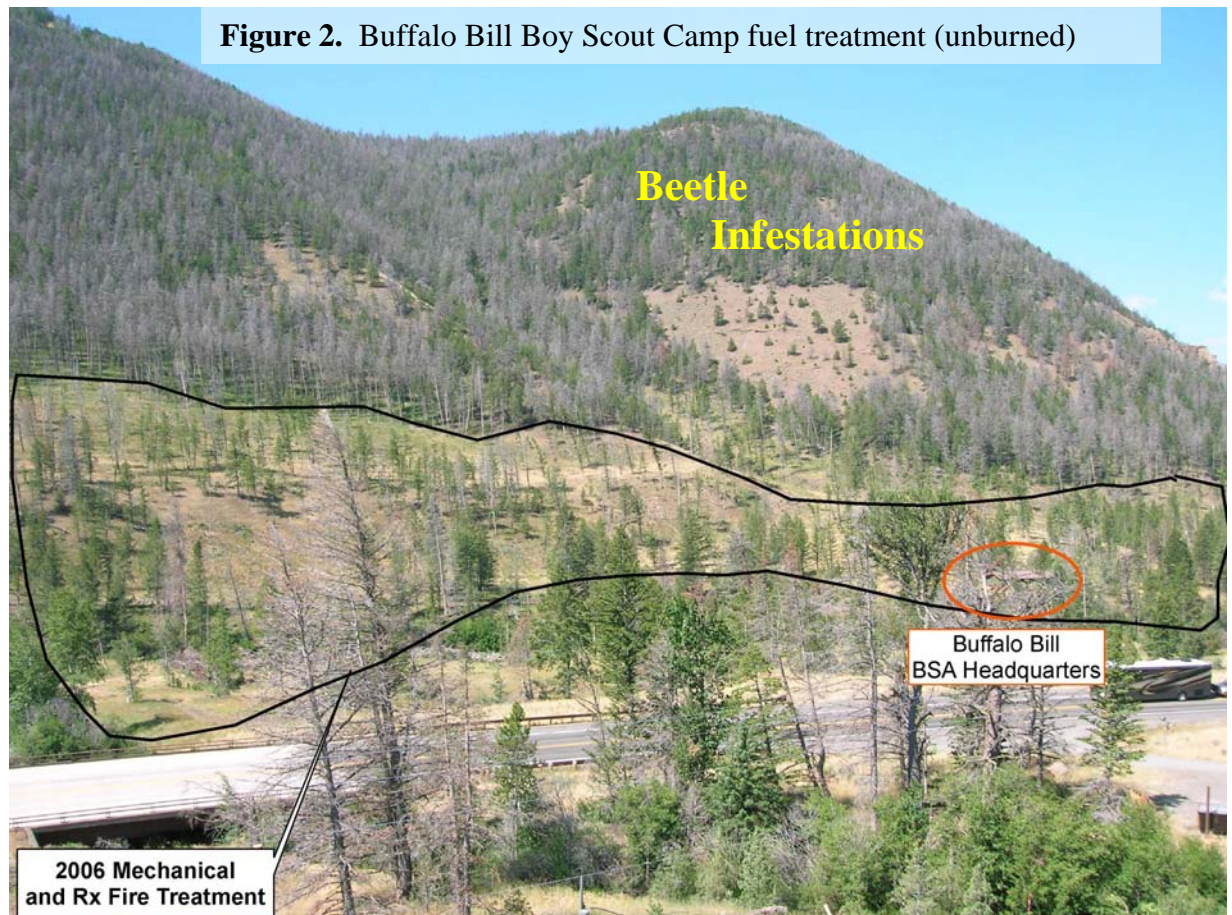


## Fire Environment

The Gunbarrel WFU burned in the drainages on the north side of the North Fork of the Shoshone River. At mid to upper elevations the fuels are dominated by spruce/fir/lodgepole that is in various stages of beetle infestation and Douglas fir/sage grass at lower elevations. Fire behavior had been most significantly influenced by the fuels, topography in and around the Gunbarrel drainage. Fire has spread primarily by mid to long range spotting (up to 1 mile) from group tree torching and crown runs. Spotting and isolated uphill crown fire runs have occurred in areas with heavier fuels, bug-killed trees, and stands of mixed conifer. Low RH, high Haines, and high winds were the most significant weather influencing the development of this fire (See Figures 4 and 5).

Conditions are drying in western Wyoming this year following a normal winter and wet spring. Most recently the ERCs and 1000hr fuel moistures are above the 97h percentile, generally following the historic average. The U.S. Drought Monitor continues to show that the region is not experiencing extreme drought but is

abnormally dry. However the effects of years of drought have not been mitigated by the winter snows and spring rains. Live fuel moistures in the fire area were above 100% by the first week in August, with averages for Douglas fir at 106, Lodgepole at 118, and Sagebrush at 140.



Severe beetle infestations compounded by ongoing drought, advanced successional stages of the forest, and nearly a century of fire suppression have resulted in overstory tree mortality of up to 90% in the forested stands of the North Fork of the Shoshone River. Of particular concern to fire managers has been the amount of standing dead trees with red needles that are easily ignited and produce very intense stand replacement crown fires. As illustrated by the Gunbarrel WFU, these fires have the potential to threaten human life and property, wildlife habitat, watershed values, municipal water supplies, socio-economics, tourism, and other resources. An additional concern has been the hazardous fuel buildup resulting from dead trees falling to the ground over the next 5 to 20 years, which may contribute to high intensity and high severity surface fires.

The insect epidemic has resulted in extreme mortality in the older aged Douglas-fir and Englemann spruce trees, which are the dominant cover types and to a lesser extent the lodgepole pine, whitebark pine, and limber pine trees. Douglas-fir beetle, spruce beetle, mountain pine beetle, and white pine blister rust infestations are all at or near epidemic status in the analysis area now (See Figure 2).



**Figure 3.** North Fork Prescribed burn treatment..

### **Chronology of fire**

On July 26, 2008 the Gunbarrel WFU was started by lightning on the Wapiti Ranger District (RD), of the Shoshone National Forest (NF). Prior strategic planning and management preparation enabled the decision to manage this ignition as a wildland fire use event. Within several days the fire became well established (500+ acres). On July 29 through July 30, Red Flag wind conditions coupled with a high Haines Index provided opportunity for major fire growth to the northeast further into the North Absaroka Wilderness, and above the North Fork of the Shoshone River.

On the afternoon of August 3<sup>rd</sup>, the Gunbarrel WFU moved rapidly through and around Special Use permit structures in the Moss and Aspen Creek areas. The structures were NOT plumbed with sprinkler systems or wrapped. Only minimal hand lines had been constructed with the intention of burn out utility. Fire intensity precluded immediate fire fighter action. Fire fighters and engines moved back until fire activity subsided and allowed for safe deployment at structures. Residences had survived well. Prompt action on 2 outbuildings and mop up of creeping ground fire and small spots secured successful outcomes in Moss and Aspen Creek areas (See Maps 2 and 3).

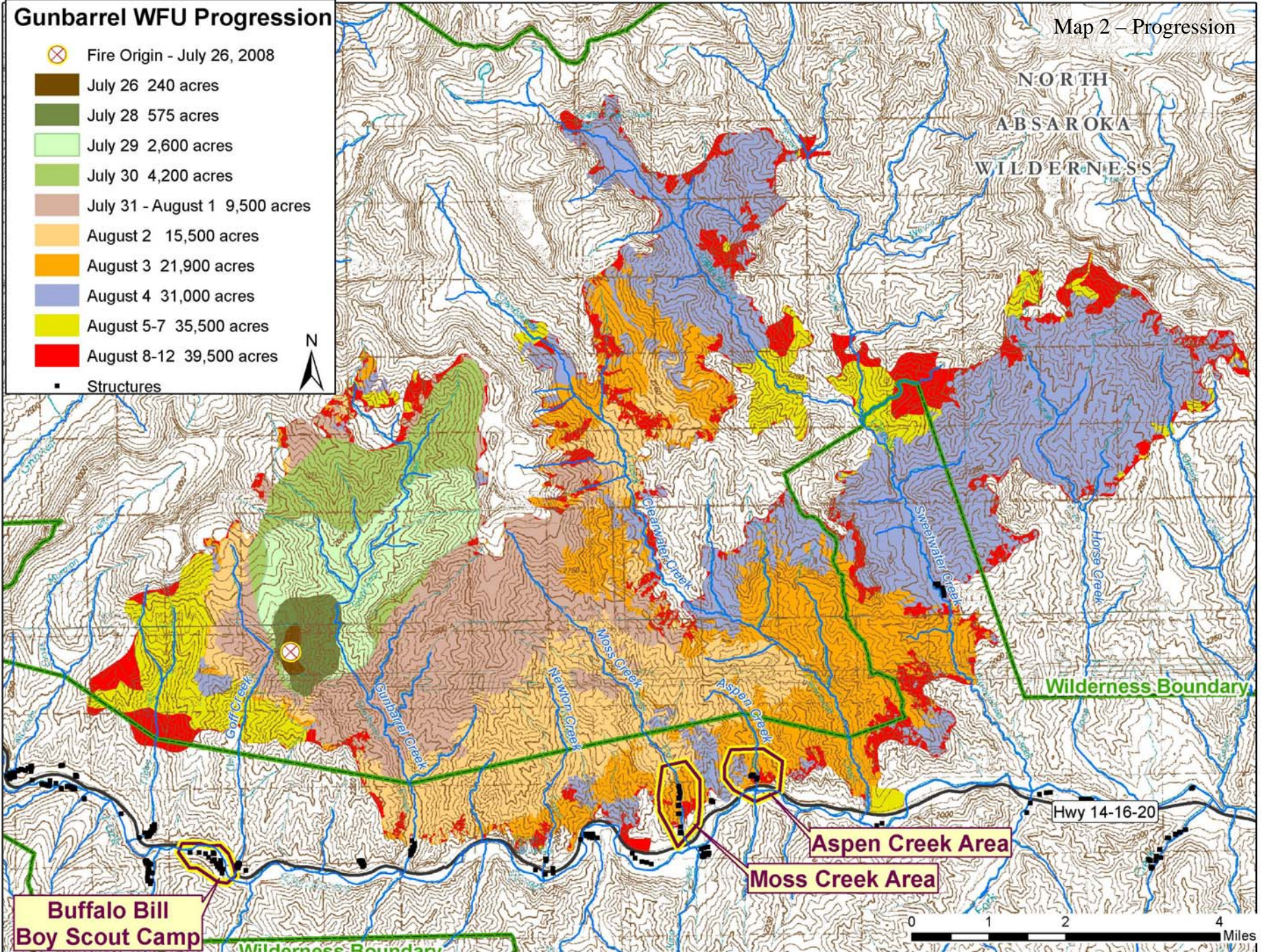


# Gunbarrel WFU Progression

Map 2 - Progression

NORTH  
ABSAROKA  
WILDERNESS

- ⊗ Fire Origin - July 26, 2008
- July 26 240 acres
- July 28 575 acres
- July 29 2,600 acres
- July 30 4,200 acres
- July 31 - August 1 9,500 acres
- August 2 15,500 acres
- August 3 21,900 acres
- August 4 31,000 acres
- August 5-7 35,500 acres
- August 8-12 39,500 acres
- Structures



Buffalo Bill  
Boy Scout Camp




Aspen Creek Area  
Moss Creek Area

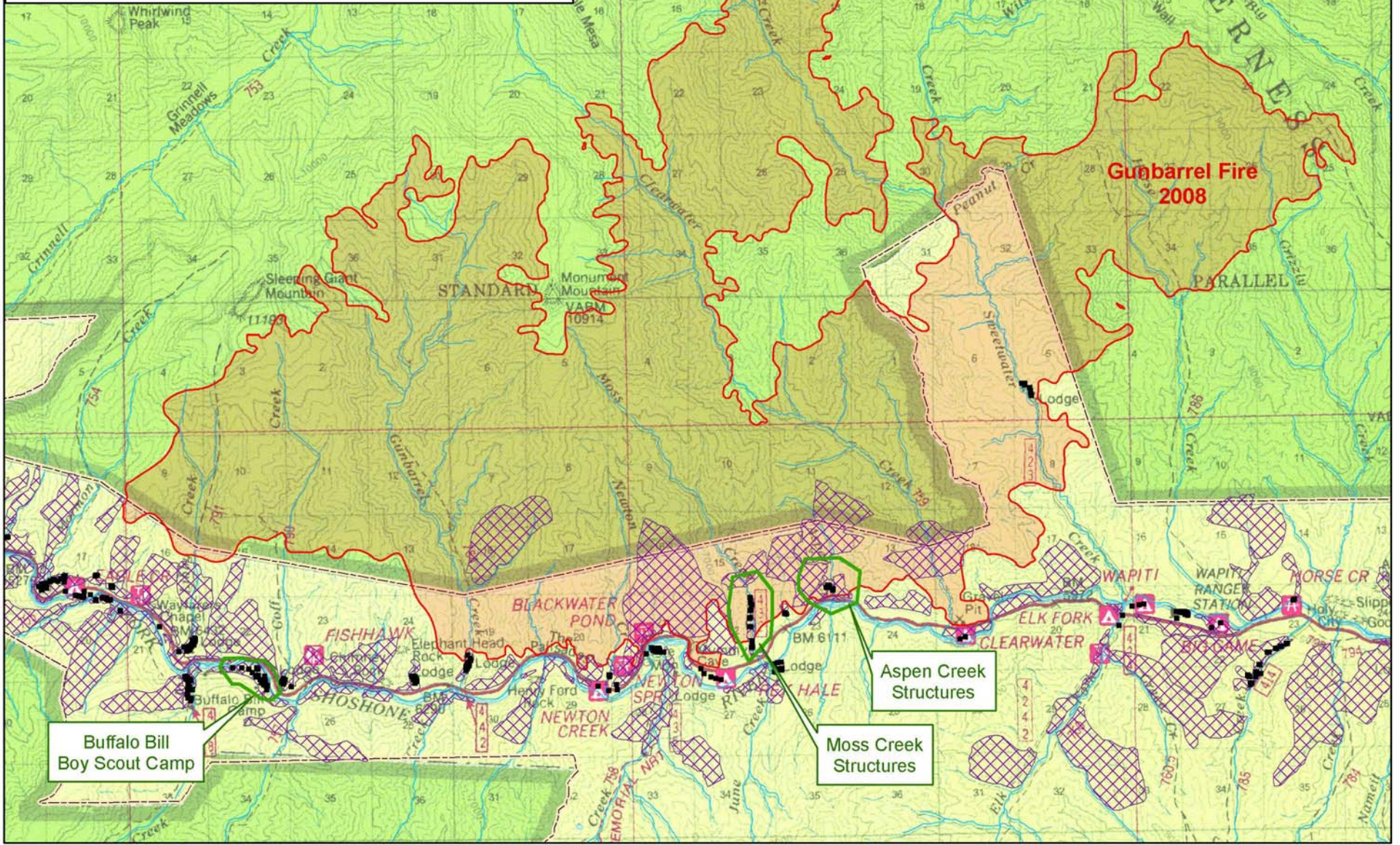
Hwy 14-16-20





# Planned or Completed Fuels Treatments North Fork Shoshone Corridor

-  Mechanical and Prescribed Burning Treatments
-  Structures
-  Fire Perimeter as of August 12, 2008



Buffalo Bill  
Boy Scout Camp

Aspen Creek  
Structures

Moss Creek  
Structures

Gunbarrel Fire  
2008



## Fire behavior and effects within and outside fuel treatments

According to John Barborinas, the Fire Behavior Analyst working with Hahnenberg's team on the fire from 7/27-8/6, spotting and isolated uphill crown fire runs during the Gunbarrel WFU influenced fire growth in areas with heavier fuels, bug-killed trees, and stands of mixed conifer. These were untreated areas.

The fire had been active during the day, with runs occurring from about noon through sundown, and stays active in pockets of heavy fuel through the night. Crews reported the most problematic active burning in the mid to lower portions of Gunbarrel drainage, where spotting of up to 1 mile moved fire down canyon into continuous fuels. (See Figures 4 and 5)

**Figure 4.** High intensity crown fire behavior.



**Figure 5.** Gunbarrel WFU approaching untreated portion of Aspen Creek drainage on August 2.



## Fuel Treatment Effectiveness

Although not all planned fuel treatments have been completed, recent efforts at Moss and Aspen Creek were adequate and effective for the conditions and fire behavior existing on August 2<sup>nd</sup> and 3<sup>rd</sup>. The Moss Creek and Aspen Creek areas within the North Fork Corridor serve to illustrate the potential value of treatments for the future. These fuel treatments were successful in making structures survivable from wildland fire with minimal protection actions. This is critical as we do not have resources to protect all structures and we want to minimize risk and exposure to our fire personnel (See Figures 6-12 and Map 3).

The ability to manage the fire under wildland fire use allowed for reintroduction of fire to the ecosystem, provided for greater firefighter safety by minimizing actions taken and resources used on the fireline, and reduced costs both for the immediate action and by treating areas with fire that were slated to be treated at some point in the future. In addition, managing the fire in this critical area enhanced the longevity of the effectiveness of the fuels treatments by connecting treated areas, consuming additional fuels, and ultimately widening the fuel breaks around the values of concern. Comparing the Gunbarrel WFU to the Cascade fire (Custer NF) which started on the same day with similar WUI concerns and fuels conditions; the lack of fuel treatments on the Cascade fire resulted in increased risk and exposure to fire personnel and a suppression cost twice that of the Gunbarrel WFU.



**Figure 6.** Moss Creek Summer Home Group--pretreatment.



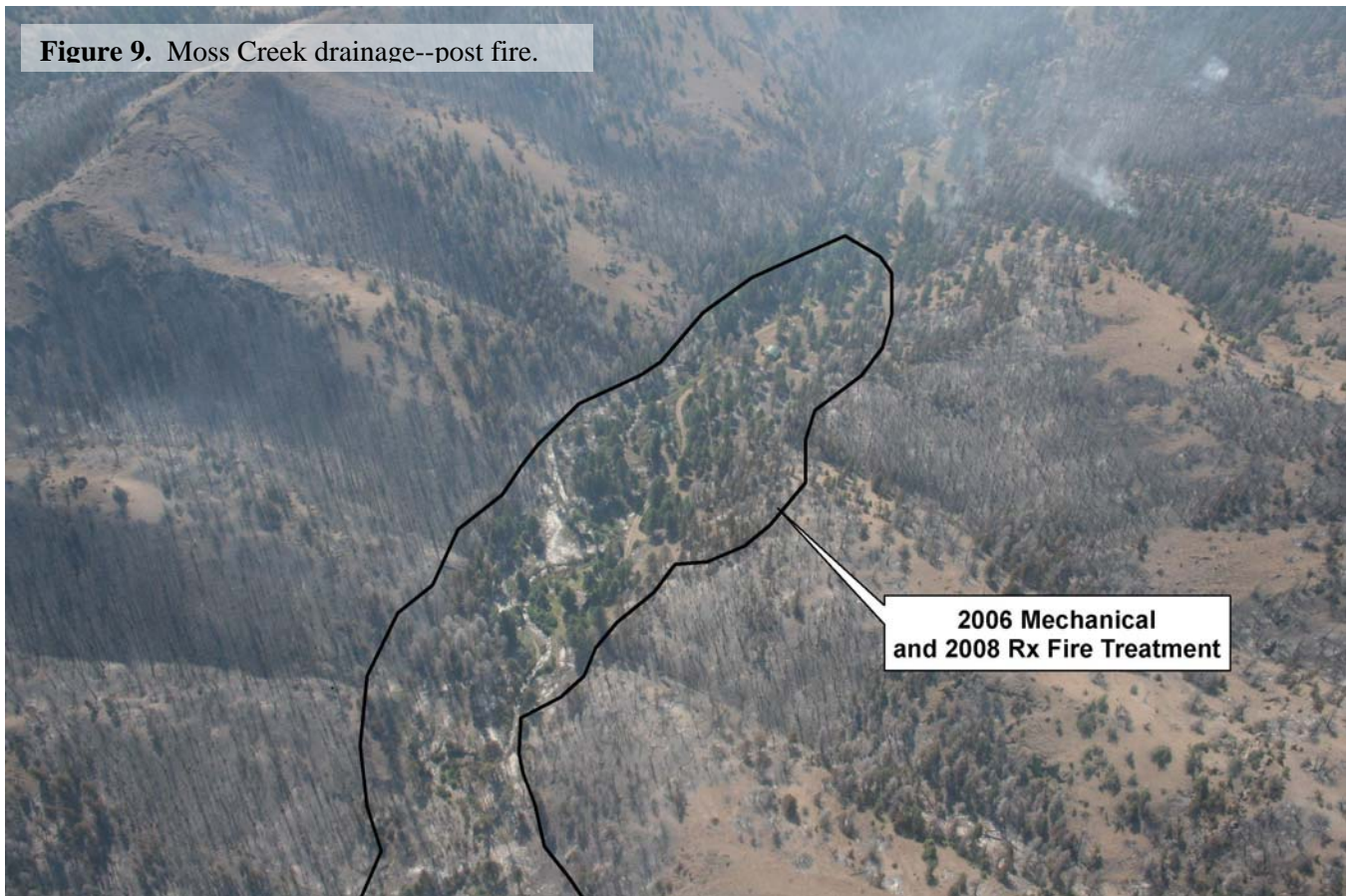
**Figure 7.** Moss Creek Summer Home Group--post treatment.



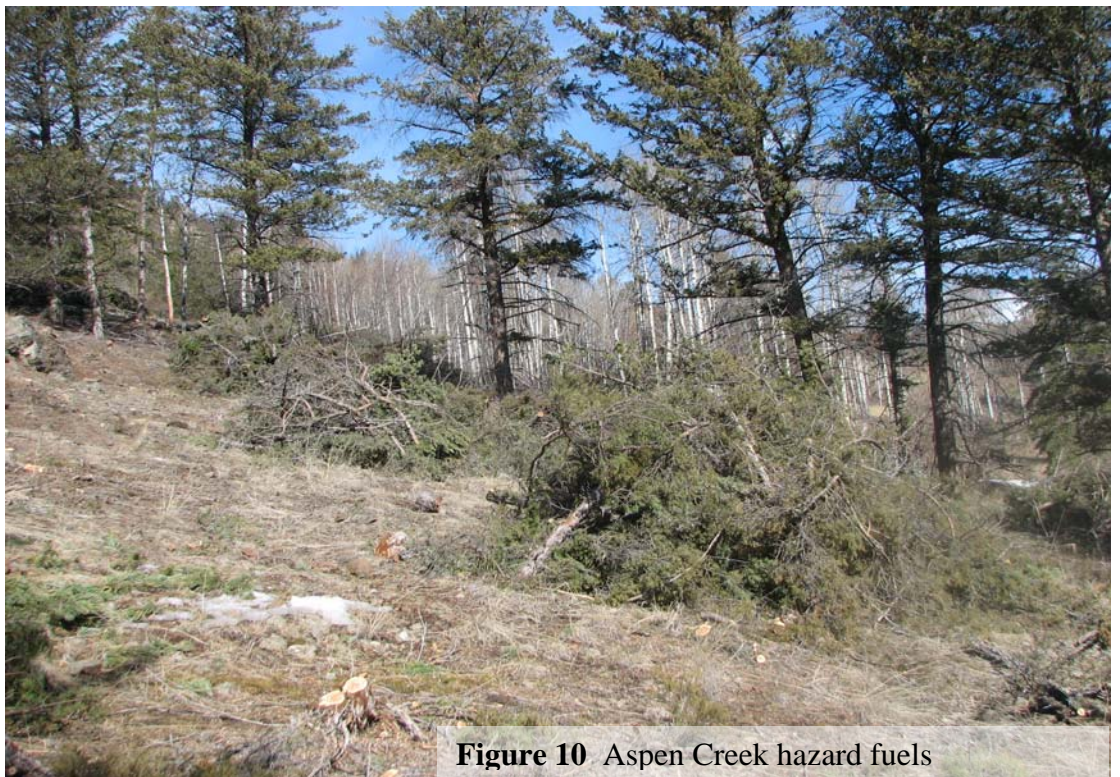
**Figure 8.** Moss Creek Summer Home Group--post fire



**Figure 9.** Moss Creek drainage--post fire.

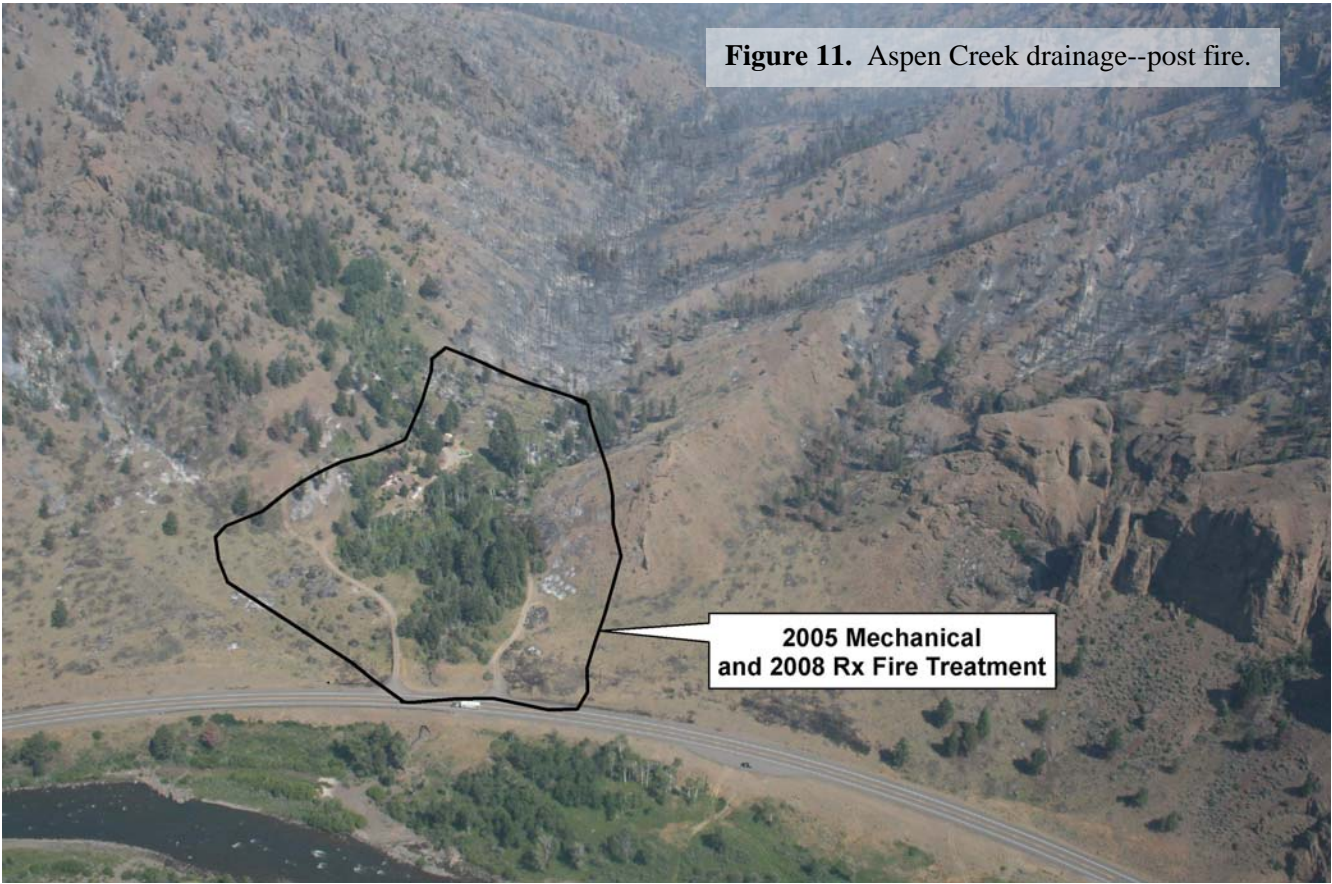


Additionally, hazard fuels reduction work in the North Fork Corridor limited the amount of time that State Highway 14/16/20 was closed and reduced resource damage in area drainages (See Figures 9 and 11). Power lines in the area were also left intact due to the treatments. Smoke complaints were minimal regarding the fire as of August 10, 2008.



**Figure 10** Aspen Creek hazard fuels

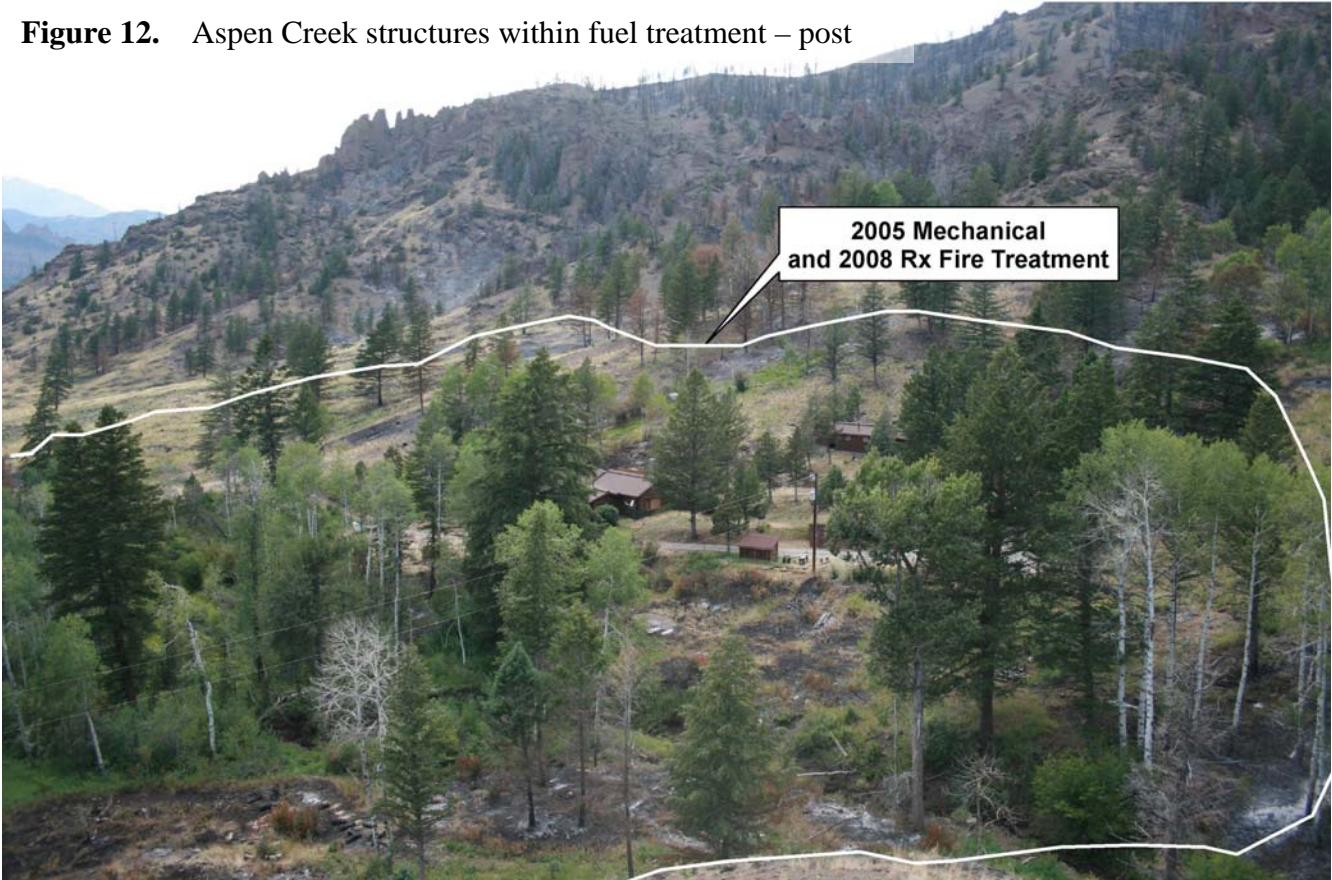




**Figure 11.** Aspen Creek drainage--post fire.

**2005 Mechanical  
and 2008 Rx Fire Treatment**

**Figure 12.** Aspen Creek structures within fuel treatment – post



**2005 Mechanical  
and 2008 Rx Fire Treatment**



## **Summary and Conclusions**

The Forest used a strategic approach to the fuels issue in the North Fork of the Shoshone NF in a comprehensive and landscape level planning effort. This effort connected all fire management tools (mechanical treatment, prescribed fire, and wildland fire use management) to a landscape scale and set the stage for success. The scheduled treatments of mechanical and prescribed fire have and will build a buffer and attempt to reduce risk to values needing protection when wildland fire occurs. These treatments will increase opportunities to restore wildland fire as a natural disturbance process.

The combination of these treatments increases the probability of success for making values to protect survivable in the long term when wildland fire occurs without extensive and expensive protection efforts.

It is unclear how climate change should effect the planning and design of fuels treatment projects for the future. However, realistically acknowledging climate change projections, it appears that landscape-level fuel treatment projects would have the highest probability of success and provide the best long-term benefits.

## **Future Considerations for Accountable Fire Management**

As a reasonable comparison, the Cascade Fire (approximately 10,000 acres) on the Beartooth Ranger District of the Custer National Forest started the same day as the Gunbarrel WFU (approximately 40,000 acres) on the Shoshone NF. The Cascade fire had similar values to be protected but major fuels treatments have not been accomplished. The response based on values to protect for this fire was more aggressive with more exposure to our firefighters and more impact to the natural resources. This strategy resulted in costs which were twice those of the Gunbarrel WFU as of August 10, 2008.

With the combined treatments in the North Fork of the Shoshone River of mechanical treatment, prescribed fire and wildland fire use; the opportunity for a very effective maintenance program that focuses on more frequent fire return intervals has a high probability of success. Initial investments will be very effective with a maintenance strategy that reduces fire management costs in the future. Investments like this are only secured over time by continued proactive and strategic fire management actions.

*Report compiled by:*

*George A Weldon – Deputy Fire Director, Northern Rockies Region*

*Roy A Hall – Assistant Director-Fuels, Southwestern Region*

*Dana L Cohen – Supervisory FPT, North Kaibab Ranger District*

*Ruth Roberson – GIS Specialist, Lewis & Clark National Forest*