

BADLANDS NATIONAL PARK  
Roadside Prescribed Burn  
Fire Monitoring Report

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Introduction

The Roadside Burn Unit is located on both sides of the Badlands Loop Road (Highway 240) which runs 28 miles through the park from the Pinnacles Entrance, south of Wall, to the Northeast Entrance, south of Cactus Flat. The actual area to be burned/already burned is generally a narrow band 10 to 100 feet from the road. The unit consists of approximately 484 acres of mixed grass prairie dominated by western wheatgrass (*Agropyron smithii*). The dominant exotic grass present is smooth brome (*Bromus inermis*), due to road building disturbance around the 1950's and subsequent reseeding. The prescription calls for two burns over the same area conducted in consecutive years or every other year, depending on the fuel loading and its ability to carry a backing fire.

The primary goals for the burn were to attempt to reduce non-native grass species (primarily smooth brome) and to increase the vigor of native species through the infusion of nutrients following the burn. The specific objectives contained in the burn plan were to:

- Burn 80-100% of the burnable project area
- Reduce relative cover of non-native grasses by 30 to 50%
- Increase relative cover of native grasses by 10 to 25% 1-yr postburn
- Increase relative cover of native forbs by 10 to 25% 1-yr postburn
- Maintain 30% reduction of non-native grass relative cover 5 yrs postburn
- Maintain increase of relative cover of native grass 5 yrs postburn

The Roadside prescribed burn unit project is divided into three phases. The burn conducted on 4/25/02 was part of phase I, officially described as 6 miles between Bigfoot Road and Quinn Road. Two separate areas within phase I were burned on the same day, both located on the south side of the Loop Road. Approximately 0.5 acres of first entry burn was conducted on the south side of the Loop Road starting at N734800 E4852841 (NAD83) and proceeding southeast around Panorama Point Overlook and ending in the badlands across from Bigfoot Road at N736809 E4853862 (NAD83). Approximately 88 acres of second entry burn, originally burned in 2000, was conducted on the south side of the Loop Road starting with the table across from Quinn Road at N728330 E4854918 (NAD83) and proceeding southeast around Burns Basin Overlook and ending at N732212 E4853215 (NAD83).

Because the prescription was identical to Roadside Burn, favorable weather conditions persisted, and there were resources available to staff the burn, a 36-acre segment of the Pinnacles Burn was also completed on the same day. This was a second entry burn of the same area that was burned in 2000. The south edge of Pinnacles Burn between the road

and the badlands was burned beginning at Pinnacles Overlook at N722234 E4861286 (NAD83) and proceeding past Sage Creek Basin Overlook at N719884 E4862308 (NAD83). The remainder of Pinnacles Burn Unit was completed later in the same season and is detailed in a separate fire monitoring report.

A total of 125 acres was burned on April 25, 2002.

Staff for Roadside Burn included IC/Burn Boss Mike Carlbom, Ignition Specialist Mark Slovek and trainee Ken Thompson, Holding Specialist Dan Morford, Lead Monitor Kevin Rehman, Cody Weink, and trainee Sandee Dingman., Safety Officer Dan Morford, and Traffic Control Linda Williams. Fire personnel in the ignition and holding assignments were from Badlands National Park and Black Hills Fire Use Module.

### Summary of Events

No preparation work was needed as the burn unit was confined between a wide, paved road and substantial badlands with no fuel. Overhead conducted briefings for personnel before the burn and a National Weather Service spot forecast and on-site weather observations were obtained to assess compliance with prescription parameters. These are detailed in the section that follows.

### Weather Observations

Monitoring of weather conditions on the Roadside burn began at 1000 and was monitored every 30 minutes until 1630 hours. Observations were communicated to all burn personnel via radio. Maximum temperature and minimum relative humidity occurred at about 1300 and showed little variation throughout the burning period.

Winds at 1000 were 4-7 mph from the northwest, diminishing in the afternoon and becoming easterly. The strongest gusts recorded were 11 mph at 1000. Weather conditions are summarized on Table 1. The table also shows status of temperature, relative humidity, and fine dead fuel moisture throughout the day.

Table 1 Weather Conditions

<b>Condition</b>	<b>Prescription</b>	<b>Predicted</b>	<b>Observed</b>
Temperature	35-90 F	Max of 52 F	48-53 F
Relative Humidity	20-60%	20-77%	22-33%
Wind Speed	2-10 mph	NW10-20, E 6-10	2-7 mph
Wind Direction	Any	NW becoming light and variable midday, switching to E in afternoon	am: steady at NW to WNW pm: light and variable NE to E to SW
1-Hr Fuel Moisture	4-11%	-----	6%

### Ignition Pattern

A backing fire from the road edge was implemented simultaneously starting at the south side of the Loop Road across from Quinn Road and at the west side of Panorama Point Overlook. Ignition proceeded from both points toward the east. Both segments were completed by about 1200. A second entry was attempted across from Prairie Wind Trail in an area that burned in 2001. Fuel was too sparse to carry fire under prevailing conditions. The operation then shifted to the south edge of the Pinnacles Burn Unit and proceeded to burn the brome adjacent to the road from Pinnacles Overlook on Loop Road to Sage Creek Basin Overlook on Sage Creek Rim Road.

### Fire Behavior Observations

Fire activity was monitored in various vegetative types and on primarily flat terrain with little variance in slope or aspect. Fire direction, rate of spread, flame zone depth, and flame lengths were measured with ocular estimation at several locations. Overall, there was excellent consumption of brome in most areas. Fire behavior observations are detailed in Table 2 and depicted in Photo 1. Note also that researcher Brent Buenger conducted thermocouple monitoring on this Burn for his research on Fire Effects on Archaeological Resources. More precise data on residence time, max temperatures, and time/temperature curves will be available in his published and unpublished reports on file in the park.

Table 2 Fire Behavior Observations

<b>Fire Type</b>	<b>Fuel Model</b>	<b>Location/ Time</b>	<b>Rate of Spread</b>	<b>Flame length</b>	<b>Flame Zone Depth</b>	<b>Comments</b>
Backing	1	Mile 14.5/ 1000	2 chains/hr	6-18 inches	4-6 inches	>90% consumption of brome
Backing	1	Mile 17?/ 1400	1+ chains/hr	2-8 inches	1-4 inches	
Backing	1	S. Pinnacles/ 1120	2 chains/hr	4-12 inches	4-6 inches	>95% consumption of brome
Backing/ Flanking	1	S. Pinnacles/ 1500	2 chains/hr	4-14 inches	4-10 inches	Variable winds
Backing	1	S. Pinnacles/ 1505	<1 chain/hr	2-10 inches	2-4 inches	Backing down ditch slope

### Fuel loading and Fuel Moisture Measurements

Samples were taken adjacent to the long-term monitoring plots before the burn. Samples were taken at four plot locations to determine biomass or fuel loading, as well as live fuel moisture and soil moisture. All samples taken were weighed and then dried at 60 Celsius for 24 hours. The mean pre-burn fuel loading was 0.58 tons/acre and varied from 0.42 to 0.67 tons/acre. The mean live fuel moisture was 266.9% and varied from 242.9% to 287.2%. The mean soil moisture was 7.8% and varied from 6.0% to 10.3%.

### Smoke Monitoring

Winds were consistently light throughout the day with good dispersion causing minimal traffic disruption. Mixing height is unknown. An impressive fire whirl was observed near the Pinnacles Overlook at about 1430 as shown in Photo 2.

### Fire Effects Observations

Unknown

### Conclusions

Since it is the long term health of the ecosystem that is the focus of the prescribed burning program, many criteria need to be assessed. Some objectives are immediately measurable while others need to be viewed over the course of several years before results can be determined. The objective to burn 80-100% of the burnable area was met with fire blackening close to (100 %) of the areas burned. It should be reiterated, however, that this is an ongoing burn and the North side of Phase I still needs a second entry burn and a first entry burn.

The reduction of exotic grass species and increase in native grasses will not be able to be assessed until new growth occurs and in successive years after the second entry burn is completed. The goal to reduce smooth brome and other non-native grasses and restore native grasses such as western wheat grass will be measured on a 1, 2, 5, 10 year postburn basis or until the next treatment of fire is applied to the unit. With a long-term fire monitoring program in place, quantifiable assessment of prescribed fire goals can be made. A summary of results is shown in table 3.

Table 3 Objectives and Results

<b>Objective</b>	<b>Results</b>
Burn 80-100% of the burnable project area	Achieved
Reduce relative cover of non-native grasses by 30 to 50%	Unknown
Increase relative cover of native grasses by 10 to 25% <u>1-yr. postburn.</u>	Unknown
Increase relative cover of native forbs by 10 to 25% <u>1-yr. postburn.</u>	Unknown
Maintain 30% reduction of non-native grass relative cover <u>5 yrs. postburn.</u>	Unknown
Maintain increase of relative cover of native grass relative cover <u>5 yrs. Postburn.</u>	Unknown

Photo 1 Typical fire behavior- slow and backing. BADL Roadside Burn 4/25/02



Photo 2: Fire whirl near Pinnacles Overlook. BADL Roadside Burn 4/25/02

