

Theodore Roosevelt National Park I-94 Block “A” Prescribed Fire Monitoring Report

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The “I-94 Block A” prescribed fire is a 205 acre section of the larger 1413 acre “I-94” burn unit in the south unit of Theodore Roosevelt National Park. Vegetation of the area is composed of short grass prairie with a small component of sage. A stringer of hardwood forest runs through the burn unit. The boundaries for the unit are Interstate 94 to the south and a mow line parallel with badlands on the east, west, and northern perimeter. Ignition occurred on May 2nd, 2003.

Overhead personnel for the I-94 burn consisted of Burn Boss Beth Card, Ignition Specialist Chad Suppa, and Dan Morford as holding specialist. Holding forces included 4 Type “6” Engines, 4 ATV’s, and one water tender. Resources included personnel from Theodore Roosevelt National Park, Wind Cave National Park, Buffalo River and Zion Fire Use Modules, D&K (private contractors), Medicine Rocks, and The Northern Great Plain Fire Monitors.

Objectives

Primary resource objectives for the burn:

- Reduce 1-hour grass litter by at least 70% immediate post burn.
- Increase percent cover and/or density of native warm-season grasses and forbs by at least 10% 1-3 years post burn
- Decrease percent cover and/or density of exotic cool-season grasses, specifically *Bromus inermis* and *Agropyron cristatum* by at least 10% 1-3 year post-burn.
- Limit overstory tree mortality in hardwood groves by at least 50% immediate postburn.
- Reduce accumulations of dead/down 1-hour, 10-hour, and 100-hour woody fuels in timbered areas by at least 25% immediate post-burn.

Summary of Events

Prior to the day of the burn, a mow line was established along the north, east, and west portions of the burn unit adjacent to the badlands that makeup the Little Missouri River valley. The southern portion of the burn unit borders Interstate 94. Long term monitoring plots were installed in 1998 and 2000 and were re-sampled in 2000. Biomass and soil moisture samples were collected at two of the plots within the burn unit the day of ignition.

The morning of the burn, a briefing was conducted for all personnel at 0600. A National Weather Service spot forecast and on-site weather observations were obtained before briefing to assess compliance with prescription parameters. On May 2nd, ignition commenced at 0835 with a successful test burn at Northern most point of the unit. Ignition ceased at approximately 1430. Perimeter mop up began immediately following completion of ignition. Mop-up of isolated heavy fuels continued the following day within the hardwood drainage.

Weather Observations

Monitoring of weather conditions for the I-94 prescribed fire began on site at 0750 and continued until 1630, two hours after ignition ceased. Because of strong winds, weather observations were taken every half-hour during ignition and broadcast over the radio on the command and tactical channels. On May 2nd, winds were recorded at 6-25 miles per hour with maximum gusts of 28 mph. Winds were predominantly from the south with a southeast component during the ignition period. Temperatures ranged from 49-65 °F, with relative humidity from 34% to 63%. Observed and predicted weather conditions are summarized in Table 1. A complete record of all weather taken during this operational period is included in Appendix A.

Table 1. Weather Conditions Observed on May 2nd, 2003

Condition	Temperature	Relative Humidity	Wind Speed (mph)	Wind Direction
Prescription	None given	No Range But 20-40% is optimal	1-15 2-10 optimal	S/ SE/ SW
Predicted	42-73	Min 25% at 1500	15-20 w/ gusts of 25	Southeast changing to South by 1200
Observed	High of 65	Min 34% at 1345	Highest winds observed at 22-25 w/ gusts 28	Southeast wind changing to South at 1000

Ignition Pattern

A test fire ignition was conducted at 0835 in the Northern most portion of the burn unit (See Map A). After the test fire was deemed successful, ignition split into two teams, both teams heading southeast along the west and east lines, heading toward Interstate 94. Igniters from both sides lit strip headfires within the interior. Once both teams reached the interstate, head fires were lit along the fence line with both ignition teams working towards each other. Ignition ceased at 1430, mop-up proceeded after a short briefing.

Fire Behavior Observations

Table 2, Fire Behavior Observed on May 2nd, 2003

Time	Fuel Model	Fire Type	Rate of Spread (ch/hr)	Flame Length	Flame Zone Depth	Comments
0915	1: Mixed-grass Prairie	Head Fire	45	2-4 feet	4 - 6 inches	Observation taken in high winds
0930	1: Mixed-grass Prairie	Backing	0.5	8-12 inches	4 – 6 inches	High winds caused backing fire to go out
1245	1: Mixed-grass Prairie	Backing/ Flanking	0.75	8-12 inches	2 – 4 inches	Observation taken at FMH plot. Burned as part of black lining
1300	1: Mixed-grass Prairie	Flanking / Backing	0.75	8-12 inches	2 – 4 inches	Observation taken at FMH plot

Biomass, Fuel and Soil Moisture Measurements

Biomass and soil moisture samples were collected at two of our FMH plots within the burn unit on May 2nd, the day ignition occurred. Biomass averaged 1.35 tons per acre in the grassland. Fuel loading in the hardwood draw was not measured. Soil moisture content averaged 19%.

Smoke Monitoring

On the day of ignition, south winds predominated pushing the smoke north. Strong gusty winds in excess of 28 miles per hour out of the south created poor smoke dispersal along the east line limiting fireline visibility to $\frac{1}{4}$ of a mile and at times limiting visibility to under 100 yards. Smoke dispersal improved once the column reached the Little Missouri River Valley.

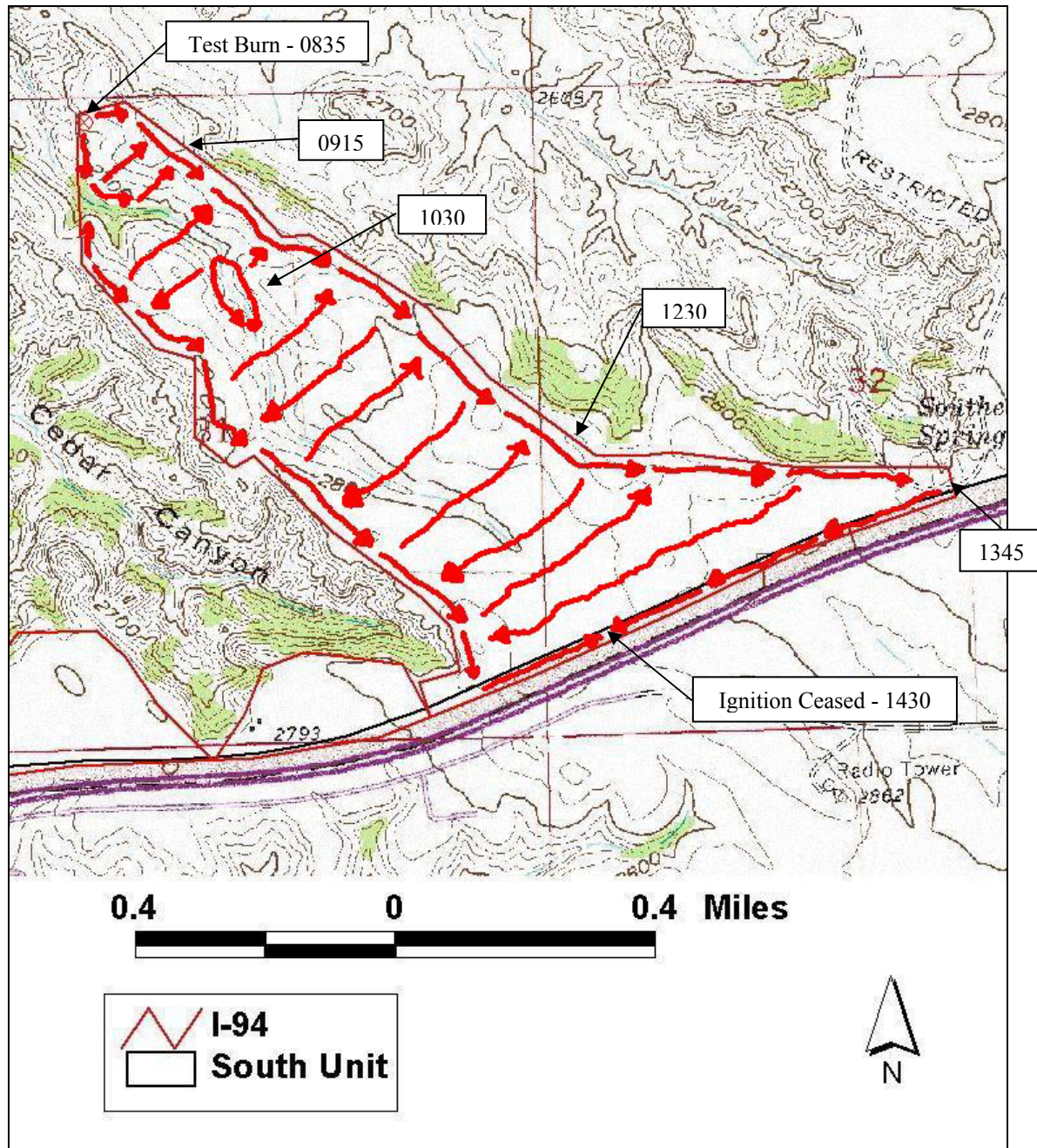
Fire Monitoring

Three long term fire monitoring plots are within this burn unit. One of the three plots was not used, due to the creation of a fire line through it. The other two plots were monitored for fire behavior during the burn operational period. Immediately following the burn, the two plots were read again to determine the burn severity of the substrate and vegetation. The plots will continued to be monitored one, two, five, and ten growing seasons following this most recent treatment of the I-94 burn unit.

Conclusions

The long-term health of ecosystems is the focus of the prescribed burning program at Theodore Roosevelt National Park. Some objectives are immediately measurable such as immediate post-burn severity. Other quantifiable specific objectives need to be viewed over the course of several years before results can be determined. With a long-term ecological monitoring program in place, a quantifiable assessment of prescribed fires specific objectives can be made.

Topographic map of Cedar Canyon showing a prescribed fire area. The map includes contour lines, a red line indicating the fire perimeter, and a red line with arrows showing the fire's progression. Key features include Cedar Canyon, a radio tower, and a restricted area. Time markers for the fire are provided: Test Burn - 0835, 0915, 1030, 1230, Ignition Ceased - 1430, and 1345. A scale bar shows 0.4 miles, and a north arrow is present.



Appendix A. Complete Weather Observations from May 2nd, 2003

Time	Location	Temp	RH	Wind	Comments
0750	walk-in gate	49	63	SE 6-8 mph	
0855	NE corner	54	50	SE 16-18 gust 20	
0925	NE corner	55	51	SE 13-18 gust 22	
0955	NE	54	50	S-SSW 16-20 gust 25	“cotton-ball” clouds moving over area
1026	NE of research plots	55	51	S 17-20 gust 25	clouds increasing slightly
1100	W boundary	56	47	S 16-20 gust 25	clouds continuing to increase
1130	W boundary	59	45	S 12-15 gust 20	
1215	SE corner	58	44	S-SSE 22-25 gust 28	
1245	SE corner	60	41	S 16-20 gust 22	
1345	Plot AGCR1	65	34	S 15-20 gust 23	cloud cover increased throughout day
1445	Plot AGCR4	62	39	S 15-20	