Theodore Roosevelt National Park
Southeast Corner Prescribed Fire
Fire Monitoring Report

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Introduction

The Southeast Corner burn unit in the southeast corner of the South Unit of Theodore Roosevelt National Park west of Medora, North Dakota. Interstate Highway 94 bounds the unit on the south, Fryburg Road on the east and badlands on the north and west. The unit has east, south and north, predominately sloping east away from the edge of the badlands. The unit was divided up into 4 blocks; A, B, C, and D. Ignition of Units A and B approximately 472 acres of mixed grass prairie occurred between the hours of 1030 and 1600 hours on 19 April 1999. The primary objective for the burn was to increase native grasses. The specific objective was to reduce 1-hour decadent fuels by at least 70% immediate postburn.

Staff for the SE Corner burn included Burn Boss Gary Kiramidjian, Burn Boss Trainee Darryn Witt, and Ignition Specialist Russ Runge. Kara Paintner and Kurt Pindel were Prescribed Fire Monitors. Fire Personnel in the ignition and holding assignments were from Theodore Roosevelt, both South and North Units, Knife River NM, the US Fish and Wildlife – J. Clark Salyer NWR, US Forest Service – Medora and Watford City Districts of the Little Missouri Grasslands and Wyoming Hotshots.

Summary of Events

Theodore Roosevelt staff did the preparation for the burn. Blacklining occurred on the west flank of the burn. Roads and mowed lines served as primary control lines on the other burn boundaries.

Burn overhead conducted a briefing for personnel on the morning of the burn. 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 the SE Corner Fire began at 0630 hours and monitored every half-hour until ignition ceased after 1600 hours. Observations were communicated to all burn personnel. Maximum temperatures occurred about 1400 hours. The minimum relative humidity was recorded at 1200 hours.

Winds started the day from the southeast, trending south toward midday and becoming southwest to west in mid afternoon. The strongest winds were recorded about 1130 hours at 8-12 mph with gusts of 18 mph. Weather conditions are summarized in Table 1. Summaries of the relative humidities and dry bulb temperatures are found in Figure 1.

Table 1 Weather Conditions

Condition	Prescription	Predicted	Observed
Temperature (F)	50-80	57	36-67
Relative Humidity	10-50%	35%	26-61%
Wind Speed (mph)	1-15	10	3-12
Wind Direction	Any	S	SE, S, SW, W
1-hr Fuel Moisture	4-12%		8-12%

Ignition Pattern

Ignition on Unit A began at approximately 1030 hours at the northwest corner of the unit. Ignition proceeded in two directions along the west and east sides using flanking fire with head fire strips being occasionally run across the unit (see Figure 2). Firing was completed about 1150 hours. Unit B ignition began at 1240 hours in the middle of the north unit line. Ignitions proceeded to east around the Wildlife corrals and down the east line utilizing backing fire. Ignition on the west line started after corrals were cleared utilizing flanking and head fire. Ignition continued with the east and west staying even until the wing fence was reached. The wing fence was separately fired and all posts were foamed before ignition continued. Unit ignition was completed at 1540 hours.

Fire Behavior Observations

During the SE Corner burn, fire activity was monitored in all aspects, and on varying slopes. Fire intensity, rate of spread, and flame lengths were measured on the long term fire effects plots and as the fire moved through the burn unit. Monitoring took place throughout the day in order to assess changes in fire behavior.

The first fire behavior observations were taken in on the north line during the test burn for Unit A. Observations, locations, and fuel types are detailed in Table 2.

Table 2 **Fire Behavior Observations**

FIRE TYPE	FUEL MODEL	LOCATION / TIME	RATE OF SPREAD (CH/HR)	FLAME LENGTH	FLAME ZONE DEPTH	COMMENTS
Head	1	N line Unit A/1035	10	1-2’	3-6”	Test burn
	1	W line Unit B/1315	20	3-5’	4’	Grass and buffalo berry
Flanking	1	N line Unit A/1035	7.5	3-4”	2-4”	Test burn
	1	Native grass plot 2 /1110	4	3-5”	1-2”	GSTVI1D01-02
	1	W line Unit B/1455	4	6-9”	3-6”	Light rain occurring
	1	Native grass plot 1 /1500	15	6-9”	3-4”	GSTVI1D01-01
	1	Native grass plot 1 /1515	3	6-8”	2-4”	GSTVI1D01 – 01
Backing	1	N line Unit A/1035	3	6”	1-3”	Test burn
	1	Native grass plot 2 /1100	2.5	2-3”	1-2”	GSTVI1D01-02
	1	N line Unit B/1245	0.5	2-3”	1”	
	1	N line Unit B/1300	2.2	2-3”	1”	
	1	Native grass plot 1 /1445	1	4”	2”	GSTVI1D01-01

Fuel Loading, Fuel and Soil Moisture Measurements

Fuel loading, fuel moisture and soil moisture samples were taken at the long term monitoring plots on the afternoon before the burn. Three samples of a known area were clipped to determine biomass or fuel loading at all plots. All samples taken were weighed and then dried at 60 degrees Celsius for 24 hours. The average fuel loading was 1.32 tons/acre and varied from 0.53-2.12 tons/ acre. Fuel moisture sampling included measuring dead fuels; dead grass and litter. The averages are found below in Table 3. Three soil moisture samples from the top 5 cm at each plot and dried with fuel and biomass samples. Dead grass and litter fuel moistures were slightly higher than the table calculated values.

Table 3 – Fuel and Soil Moistures

Sample Type	Moisture (%)
Dead grass	7.3
Litter	8.6
Soil	36.0

Smoke Monitoring

Rotating winds and high gusts sometimes made smoke dispersal problematic. Winds started the day from the southeast and had switched from the west by the end of the day. High wind gusts through out the day made visibility on the line poor at times. The smoke column, when not effected by strong gusts, did rise nicely due to unstable atmospheric conditions and good transport winds. Traffic on Fryburg Road was stopped briefly around 1530 hours because smoke across the road was causing very low visibility. No residual smoke was reported in Fryburg or Belfield overnight.

Fire Effects Observation

Five long-term fire monitoring plots are located within the SE corner unit. Two mixed grass prairie plots were burned during the ignition of Units A and B. These plots were read immediately postburn to determine burn severity and will be read 1, 2, 5, and 10 yeas after the fire to determine the vegetative effects of this prescribed burn. The Fire Monitoring Handbook has levels of fire severity that describe the intensity which material burned. Separate readings are taken for substrate (litter and soil) and vegetation to determine severity. The average severity for both plots substrate was scorched. The short residence time of the fire blacked the thatch layer with little consumption of litter or duff. The vegetation severity was different in the two plots – one showed lightly burned and the other scorched. The plot located in Unit A was lightly burned and had a much higher fuel Loading, 1.92 tons/acre. The plot in Unit B was scorched and had fuels of 0.62 tons/acre. Visual estimates showed that about fifteen percent of Unit A was unburned and twenty-five percent of Unit B was unburned.

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 burn plant objective to reduce 1-hour decadent fuels by at least 70% immediate postburn was not met. It may be unrealistic to expect high litter consumption with head and flanking fires in light fuels. This objective should be reassessed before the next burn in this monitoring type. With a long-term fire monitoring program in place, quantifiable assessment of prescribed fire goals can be made.

Attachments

SE Corner Map
Figure 1 – Temperature, Relative humidity, Fine dead fuel moisture, and Cloud cover