

Devils Tower National Monument North Terrace FY05 Prescribed Fire Monitoring Report

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Northern Great Plains Fire Effects Monitors



Burn Unit Summary

The North Terrace FY05 RX was comprised of 2 subunits. Blocks A and B were 77 and 126 acres, respectively. Block A was completed September 22 and Block B was completed September 23. Participants included personnel from Yellowstone and Black Hills Fire Use Modules, Wind Cave NP, Badlands NP, Mount Rushmore NM, Devils Tower NM, Bear Mountain and Black Hats Hand Crews (State of South Dakota), as well as USFWS.

Block A was bounded by the Red Beds Trail on the east and west, then a constructed fireline on the south. The boundary for Block B was formed by the Red Beds Trail on the south, the paved Visitor Center access road on the west, and the Joyner Ridge gravel road and trail on the north.

22 September 2005

Size of Block A: 77 acres burned

Aspect: predominantly northeast

Elevation: 3900-4300 feet

Vegetation Type: ponderosa pine forest, pine woodland with mixed-grass understory; and bur oak savanna in the drainages.

Personnel:

Burn Boss: Dan Morford

Ignition Specialist: Robert Kobza

Holding Specialist: Eric Allen

Fire Monitors: Andy Thorstenson, Tyler Schmitt, Katie Johnson, and Jim Cheatham (T)

Lookout/Repeater: Martha Jakobek

Engine Bosses: E-624: Brandon Oberhardt; E-626: Joe Johndreau; E-627: Mike Antonsen; E-629: Mark Davison; E-623: Brian Hatfield; E-6262: Mark Finnegan

6 Type-6 Engines

3 ATVs

23 September 2005

Size of Block B: 126 acres burned

Aspect: predominantly north

Elevation: 3900-4300 feet

Vegetation Type: ponderosa pine forest, pine woodland with mixed-grass understory; and bur oak savanna in the drainages.

Personnel:

Burn Boss: Dan Morford

Ignition Specialists: Robert Kobza

Holding Specialist: Eric Allen

Fire Monitors: Andy Thorstenson, Tyler Schmitt, Katie Johnson, and Jim Cheatham (T)

Lookout/Repeater: Martha Jakobek

Engine Bosses: E-624: Brandon Oberhardt; E-626: Joe Johndreau; E-627: Mike Antonsen; E-629: Mark Davison; E-623: Brian Hatfield; E-6262: Mark Finnegan

6 Type-6 Engines

3 ATVs

Objectives

Objectives of North Terrace RX include:

1. Limit overstory tree (>6" dbh) mortality to less than 30%, 2 yr. postburn.
2. Reduce dead and down (10-hr, 100-hr, 1000-hr) fuels 30-50%, immediate postburn.
3. 30-90% mortality in <6" dbh trees.
4. Burn 80-95% of burnable project area.
5. Decrease non-native herbaceous density and relative cover by at least 10%, 1 yr. postburn.
6. Provide for personnel safety.

BLOCK A

Weather Observations

9/22/05 Time	Temperature		Dew Point	RH	Wind		Comments
	Dry	Wet			Speed	Direction	
0600	50	45	41	70	1	NNW	Early obs. for spot
1030	54	48	43	67	-	-	Lookout
1100	56	47	39	53	2-4;g6	SSE	Partially sheltered
1200	58	48	40	50	1-2	SE	Partially sheltered; Pt F
1300	64	50	38	39	3-5;g8	SSE	N end of block A
1400	62	49	38	41	5-8;g10	S	Middle of S line
1500	58	49	42	55	1-3	variable	Lookout
1600	58	49	42	55	light	variable	Lookout
1700	63	49	37	38	12;g18	W	Exposed site; SE corner
1800	61	49	39	44	5	S	Exposed site; SE corner

Fire Behavior Observations

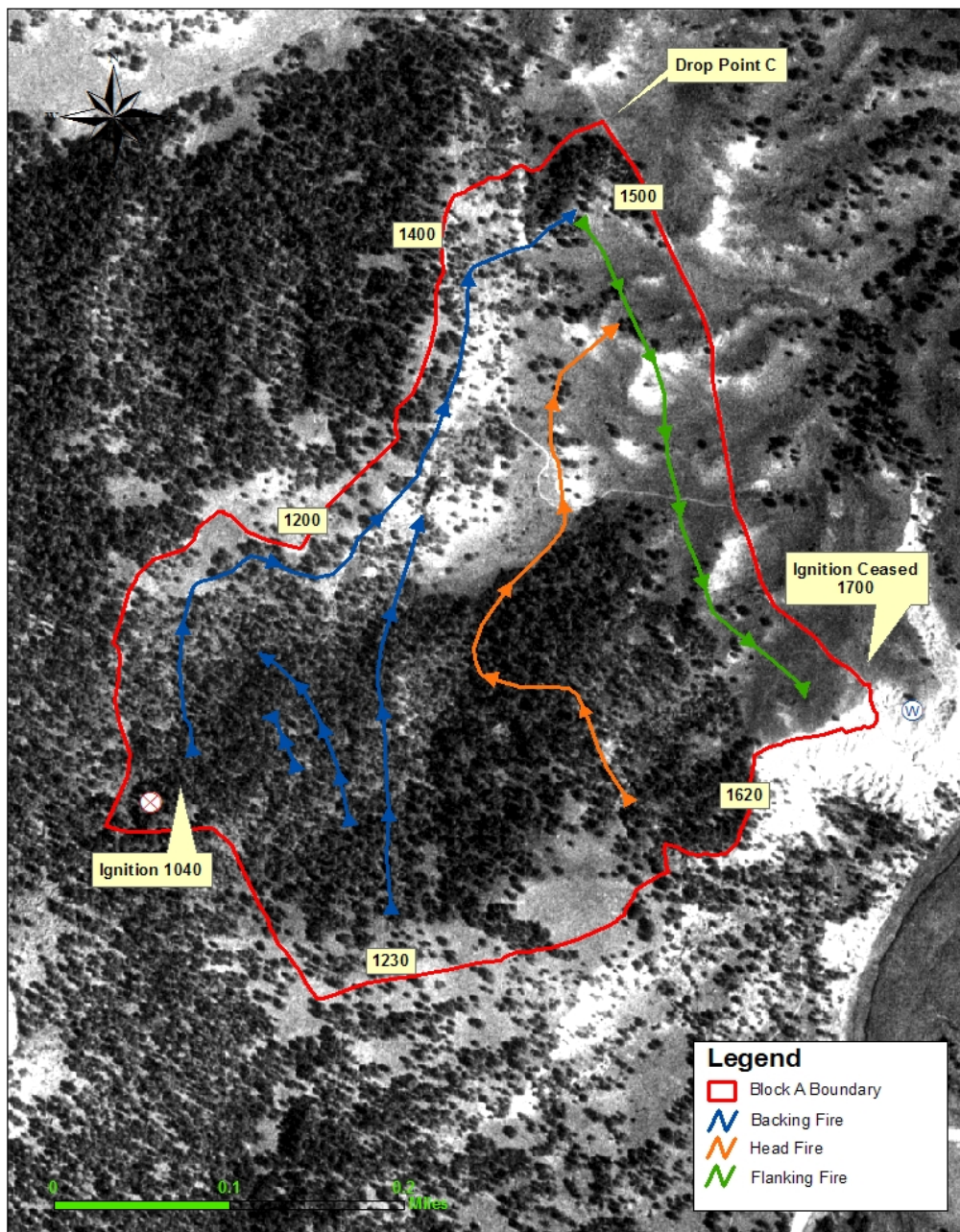
Fire behavior observations were recorded periodically as fire progressed through North Terrace Block A. Rate of spread (ROS) and flame lengths (FL) were documented at numerous random locations and at 1 FMH plot. Observations were made in ponderosa pine forest and woodland (fuel models 9 and 2, respectively) as well as native mixed-grass fuels (fuel model 1).

9/22 Time	Location	Fire Type	ROS	FL	Comments
1140	Dog-leg W line	B	2	3"-1'	E aspect
1205	W line	B	1.5	3"-1'	E aspect
1600	Midpoint E line	H	20	4'	Run into unit
1600	E line	F	3	6"	NE aspect
1700	Lower slope	F	4	12-18"	NE aspect

ROS= chains per hour (c/h)

Fire Progression

9/22/05: The test fire for Block A was started at 1040. From Point F (the southwest corner of unit-see map below), ignition team 1 proceeded north and ignition team 2 proceeded east. From 1320-1400, ignition team 1 held at NW corner (steep slope above drop point C) to allow holding crews to extinguish spots along the western ridge-top. Utilizing backing and strip head firing, ignition team 2 continued east toward Point E. By 1700, ignition teams secured the unit perimeter near Point E.



BLOCK B

Weather Observations

9/23 Time	Temperature		Dew Point	RH	Wind		Comments
	Dry	Wet			Speed	Direction	
0600	56	48	41	58	1-2	W	Visitor center area; spot
0900	58	50	44	59	5	W	Point F
1000	62	52	45	53	1-4	SW-NW	N aspect; unshaded
1100	64	53	45	50	1-8	SW-variable	Joyner ridge lookout
1200	69	55	45	43	2;g4	NNW	NE corner
1300	72	57	47	42	1	variable	Drop point C
1400	74	57	46	37	calm	n/a	Sheltered bottom, N line
1500	76	57	44	32	calm	n/a	Joyner ridge lookout
1600	73	56	44	36	light	NNW	Joyner ridge lookout
1700	66	53	44	44	2-7	NE	N line
1745							Lightning strikes to SW
1820	63	51	42	46	light	variable	Light rain

Fire Behavior Observations

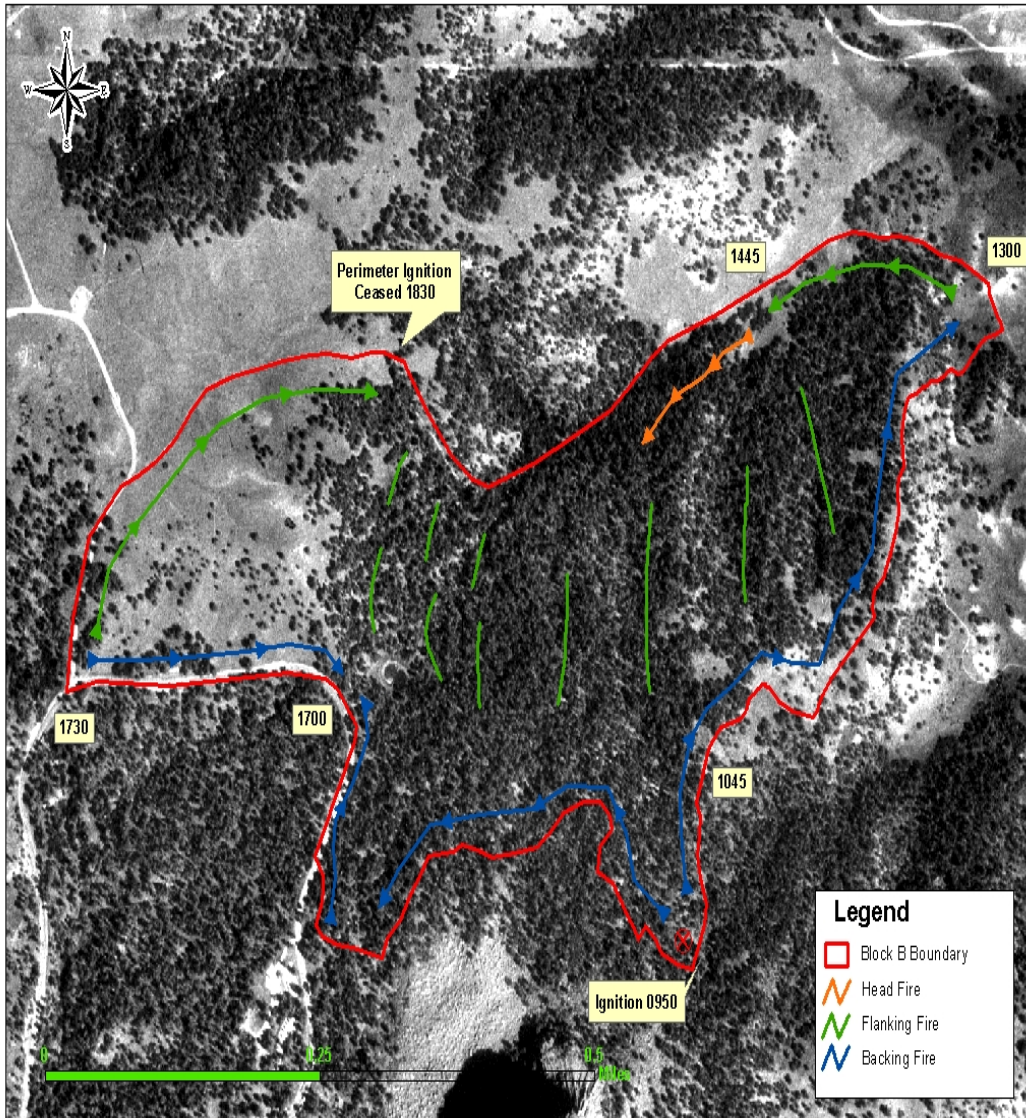
Fire behavior observations were recorded periodically as fire progressed through North Terrace Block B. Rate of spread (ROS) and flame lengths (FL) were documented at numerous random locations. Observations were made in native and non-native mixed-grass fuels (fuel model 1) as well as ponderosa pine forest/woodland fuels (fuel model 9 and 2, respectively).

9/23 Time	Location	Fire Type	ROS	FL	Comments
1020	Test fire, Point F	B	0.3	3-6"	Flat
1035	Near Point G	H	15	1'	20% slope; erratic fire winds
1110	FMH plot PIPO-03	B/F	3	6-10"	10% slope; B/F downslope
1225	FMH plot PIPO-03	B	1	2-8"	FM9; 5-10% slope
1400	FMH plot PIPO-05	B	1	3-5"	FM9; 5% slope; N aspect
1445	N line; enclosure	B	2/3	4-8"	35% slope
1600	FMH plot PIPO-01	B	<1	3-8"	FM9; 15% slope
1800	Joyner meadow	F	2	12-16"	FM1; flat
1815	FMH plot POPR-2	H	20	5-8'	T-storm over unit

ROS= chains per hour (c/h)

Fire Progression

9/23/05: The test fire for Block B was started at 0950. From Point F, team 1 (ignition and holding) proceeded north while team 2 proceeded west. Both ignition teams utilized backing and strip head firing along the perimeter, then coordinated interior ridge firing techniques to minimize upslope head fire runs through the unit. From 1500-1630, ignition and holding resources constructed a hand-line near the midpoint of the N line to exclude areas of heavy fuel accumulation. The unit was secured at the NE corner of the meadow at 1830.



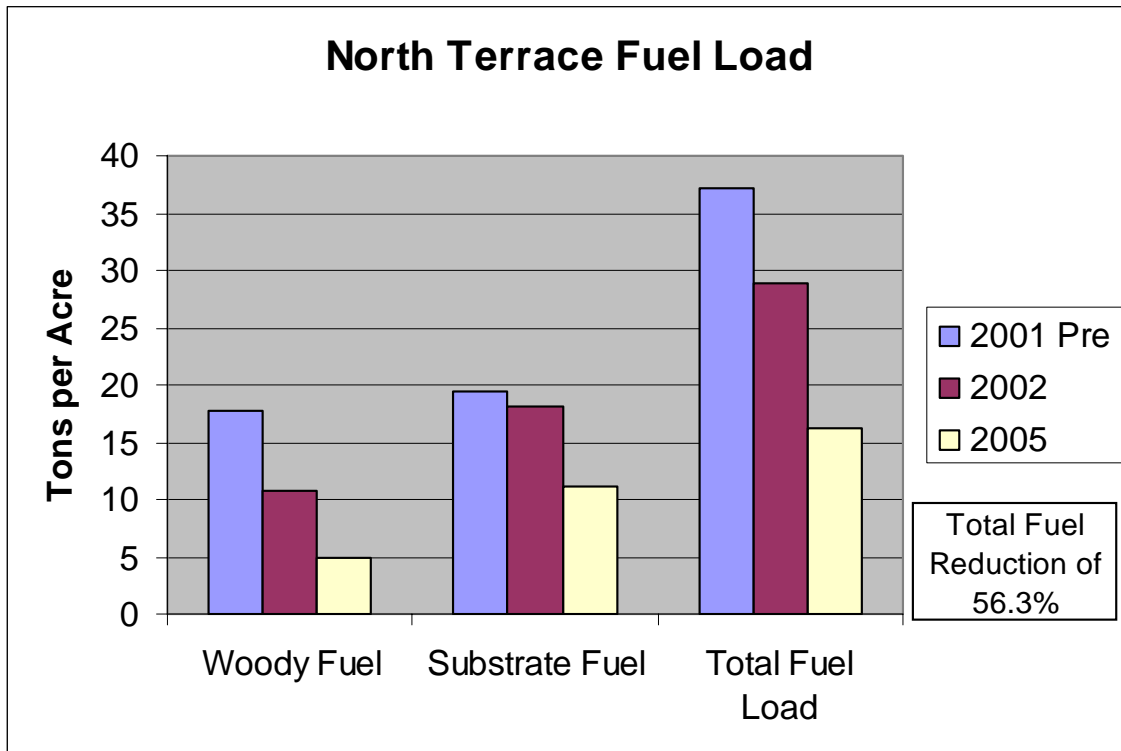
Fuel Moisture and Fuel Loading: Blocks A and B

Fuel Type	Fuel Moisture Content (%)			
	9/12/05		9/17/05	
	N aspect	E aspect	N aspect	E aspect
Live Pine	126	104	132	134
Live Grass	78	61	93	60
Duff	19	6	15	13
Litter	9	6	44	7
10-hr	13	12	11	8
1000-hr	18	8	14	13

**Note: Fuel moisture sampling was conducted by Resource Management staff at DETO.

North Terrace Fuel Loading				
Year	Substrate Depth	Substrate Fuel Load	Woody Fuel Load	Total Fuel Load
2001	2.3 inches	19.4	17.7	37.1
2002	2 inches	18.1	10.7	28.8
2005	1.1 inches	11.2	5.0	16.2

**Note: Fuel loading in tons/acre; 5 plots sampled



Fire Monitoring: Blocks A and B

One long-term monitoring plot (FMH) is located within North Terrace Block A. This plot, **FPIPO1D0208**, burned on 9/22. Post-burn severity assessments showed: 15% of the vegetation as heavily burned, 53% as moderately burned, 23% as lightly burned, and 10% as scorched. Substrate severity measurements showed: 10% as heavily burned, 28% as moderately burned, 50% as lightly burned, and 13% as scorched.

There are 5 long-term monitoring plots in Block B. All 5 burned on 9/23. Post-burn severity assessments in non-native Kentucky bluegrass prairie (**GPOPR1D0102-1 plot**) showed: 100% of the vegetation as moderately burned. Substrate severity measurements showed: 29% as lightly burned and 71% as scorched. Post-burn severity assessments in ponderosa pine/mixed-grass savanna (**FPIPO1D0204-1 plot**) showed: 5% of the vegetation as heavily burned, 8% as moderately burned, and 88% as lightly burned. Substrate severity measurements showed: 5% as heavily burned, 10% as moderately burned, 45% as lightly burned, and 40% as scorched. Post-burn severity assessments in ponderosa pine forest (**FPIPO1D09-3 plots**) showed: 7% of the vegetation as heavily burned, 20% as moderately burned, 60% as lightly burned, 8% as scorched, and 5% as unburned. Substrate severity measurements showed: 5% as heavily burned, 18% as moderately burned, 39% as lightly burned, 32% as scorched, and 6% as unburned. These plots will be read 1, 2, 5, and 10 years post-burn to facilitate the documentation of vegetation change.

Smoke Monitoring: Blocks A and B

During both operational periods, the interaction of south/southwest transport winds and complex topography meant that fire personnel were only sporadically impacted by smoke. On 9/22 & 9/23, smoke was rapidly dispersed by strong mixing winds and, as a result, only slightly impacted the Visitor Center access road and nearby private residences. The National Weather Service predicted excellent smoke dispersal for both days with mixing heights at 3500 and 7800 feet above ground level.

Conclusions

Approximately 203 acres were treated at North Terrace FY05. Based upon post-burn observations and fuel load measurements, the following project-specific objectives were met successfully:

- Burn 80-95% of the burnable project area (approximately 90% of the unit was burned)
- Reduce dead and down (10, 100, 1000) fuels by 30-50% immediate post-burn (calculations revealed greater than 50% reduction in woody fuels; results depicted above)

Over time, vegetation monitoring will be conducted at six FMH plots to determine whether these remaining project-specific objectives were achieved:

- Limit overstory tree (>6" dbh) mortality to less than 30%, 2 yr. post-burn
- 30-90% mortality in <6" dbh trees
- Decrease non-native herbaceous density and relative cover by at least 10%, 1 yr. post-burn

