Theodore Roosevelt National Park
Southeast/I-94 Prescribed Fire Monitoring Report

Prepared by andy thorstenson and Tyler Schmitt

Burn Unit Summary

The Southeast Corner and I-94 prescribed fire unit is a 1213 Acre unit in the southeast corner of the South Unit of Theodore Roosevelt National Park. The area burned during two operational periods on April 22 and 23, 2004 totaling 910.8 acres. This area had been previously treated in 3 separate prescribed fires. Blocks G and H burned in April of 1999, Block F burned in May of 2000, and Block A of the unit burned in October of 2002.

22 April 2004
Size: 388 acres burned in Block A and Block H (76 and 312 acres, respectively).
Vegetation Types: Non-Native Mixed Grass Prairie, dominated by crested wheatgrass in Block A and a mix of native and non-native grass in Block H.
Personnel:

Burn Boss: J.P. Mattingly, Rick Willoughby (trainee)
Ignition Specialist: Mark Smith, Rod Skalsky (trainee)
Holding Specialist: Kevin Merrill
Strike Team Leader-Engines. Steve Grater, Shawn Price (trainee)
Fire Monitors: andy thorstenson (lead), Katie Johnson (trainee), Tyler Schmitt (trainee)
Holding Resources
6 Type 6 Engines
1 ATV
1 Water Tender

23 April 2004
Size: 598 acres burned in Blocks F and G (331 and 267 acres, respectively).
Vegetation Type: Mix of native and non-native grass in Block F and G.
Personnel:

Same as 22 April.

Objectives

Objectives of the Southeast/I-94 RX are as follows:

1. Reduce 1-hr dead & down fuels in prairie by at least 50% immediate post-burn, not to exceed 85%, averaged over the entire burn unit.
2. Increase percent cover of native warm season grasses and forbs by 20% two years post burn.
3. Decrease percent cover of non-native cool season grasses by 20% two years post burn.
4. Hardwood mortality not to exceed 10%.

Weather Observations

4/22/04	Temperature		Dew		Wind		
Time	Dry	Wet	Point	RH	Speed	Direction	Comments
0800	37˚	32˚	24˚	59	n/a	n/a	
0935	50˚	41˚	30˚	46	8-10, g15	sse	fdfm-11%
1030	51˚	44˚	37˚	55	6-8, g 12	sse	10% cloud cover
1100	54˚	45˚	36˚	50	7-9, g 13	s	fdfm- 9%
1200	58˚	47˚	35˚	42	7-9, g 15	sse	fdfm- 7%
1300	60˚	48˚	37˚	41	9-11, g 14	s	
1400	58˚	45˚	31˚	35	9-11, g 16	ssw	65% cloud cover
1500	58˚	46˚	34˚	40	10, g 15	sw	95% cloud cover
1610	60˚	47˚	34˚	37	6-8, g 13	wsw	
1700	60˚	47˚	34˚	37	10-12, g 18	wsw	70% cloud cover
1800	56˚	46˚	36˚	47	8, g 16	w	

fdfm-fine dead fuel moisture

4/23/04	Temperature		Dew		Wind		
Time	Dry	Wet	Point	RH	Speed	Direction	Comments
0945	45˚	39˚	32˚	59	4-6, g 8	ese	
1050	47˚	32˚	32˚	55	2-4, g 7	ese	fdfm- 10%
1130	50˚	41˚	30˚	46	9-11	se	fdfm- 9%
1200	53˚	42˚	29˚	39	5-10, g 12	ese-sse	
1310	54˚	42˚	27˚	35	1-4, g 9	se-sw	topo winds
1350	55˚	43˚	29˚	36	1-5	se	
1500	57˚	43˚	26˚	30	3-7, g 10	se,s,sw	fdfm- 6%
1600	59˚	45˚	29˚	32	6-10, g 12	se	fdfm- 7%
1700	59˚	45˚	29˚	32	7-10, g 12	sse	
1800	58˚	44˚	27˚	31	12-14, g 19	sse	

fdfm-fine dead fuel moisture

Fire Behavior Observations

Fire behavior observations were recorded periodically as fire progressed through Blocks A, H, G, and F of the Southeast Corner/I-94 burn unit. Blocks A and H were burned separately on 4/22/04; Blocks G and F were burned together on 4/23/04. Rate of spread (ROS) and flame lengths (FL) were measured at numerous random locations and at 3 FMH plots. The vast majority of observations were conducted in native, non-native short-grass fuels (Fuel Model 1).

4/22/04 In Block A, the most intense fire behavior occurred between 1100 and 1300 in the western segment of Block A. In this segment, fuel accumulations were comparatively higher than in the segment east of the sewage lagoon. Consequently, fire behavior diminished by 1310 as ignitions approached, then continued east of the lagoon. At 1330, head fire stripping failed to spread fire through the unit. Ignitions ceased at 1355 in Block A. In Block H, ignitions began at 1515 at the bison corrals. Documented backing fire FL ranged between 2-12 inches with ROS between 1 and 4 chains per hour (ch/hr). Documented head fire FL were 2-3 feet with ROS to 30 ch/hr.

4/23/04 The test fire was started at 1145 in the NW corner of Block G; the two ignition teams met at 1745 along the southern boundary of Block F. Head fire FL ranged between 6 inches and 4 feet with ROS of 2.5 and 24 ch/hr (ROS=60 ch/hr observed in anomalous FM6). Backing fire FL ranged between 4-18 inches with ROS between 1.5 and 24 ch/hr. Fire behavior observations are shown in following table.

Flanking fire in mixed grass, Block G

Fire Behavior Observations

Date	Time	Location	Fire Type	ROS	FL	Comments
4/22	1100	*Air quality station	backing	2	6-10”	pathchy, grazed fuels
4/22	1130	*Air quality station	flanking	2	6-14”	pathchy, grazed fuels
4/22	1300	*Sewage lagoon	heading	0	0	no fire spread ; heavily grazed
4/22	1535	**Corrals	backing	1.5	4-6”	skies overcast
4/22	1550	**E fenceline	backing	2	8-12”	90-95% fuel consumption
4/22	1740	**NE corner	backing	1.2	2-4”	backing fire most active
4/23	1145	NW corner of Block G	heading	24	1-1.5’	test fire
4/23	1250	Plot STVI1	f/backing	3	4-6”	patchy fire progression
4/23	1430	N of G-F mowline	f/heading	60	2-3’	FM6 snowberry
4/23	1700	Plot STVI3	f/heading	24	2-4’	SE corner of Block F

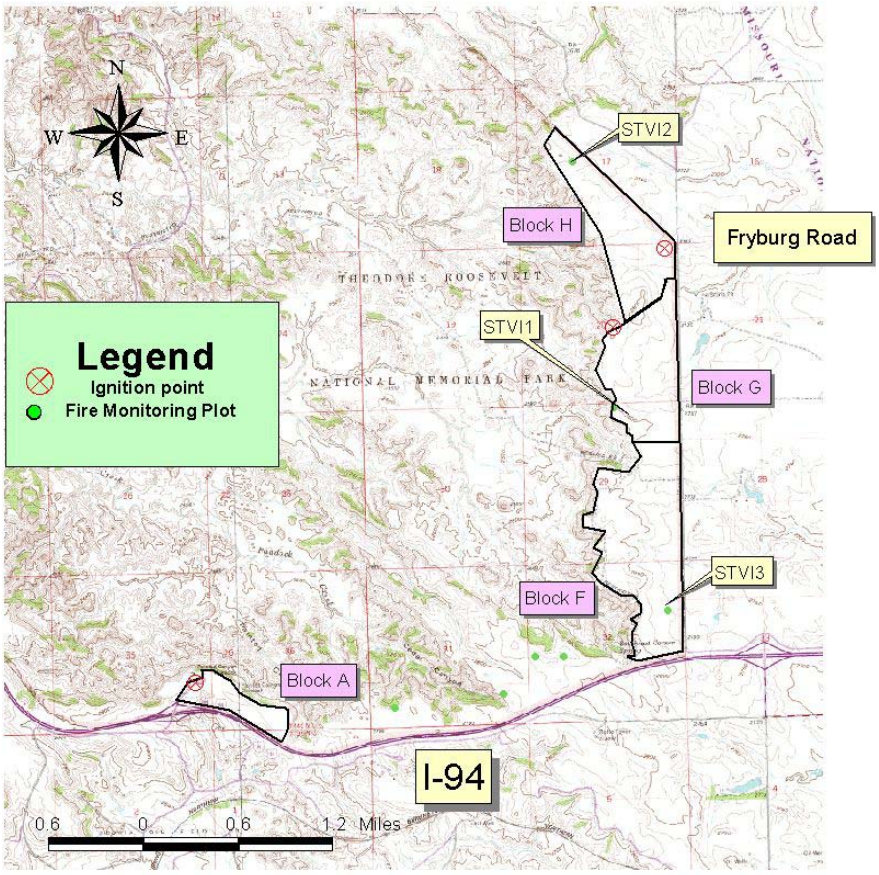
ROS = rate of spread measured in ch/hr (1 chain = 66 feet or 20 meters)
*= Block A; **= Block H

Biomass

Type	Sample size	Fuel Loading	Comments
Green Needlegrass	3	0.84 tons per acre	burned in spring 1999 or spring 2000
Crested Wheatgrass	3	0.53 tons per acre	burned in fall 2002 or spring 2003

Sparse fuel conditions existed in the I-94 portion of the unit which had burned in fall of 2002 or spring of 2003 and had only one season of fuel accumulation.

Fire Progression



4/22/04 In Block A, the test fire began at 1030 immediately east of the Painted Canyon Visitor Center. Two teams proceeded east and south away from the NW corner. The east team ignited around the air quality station by 1200. The south team ignited to I-94 by 1230. The two teams met 1355 at the SE corner of Block A. Due to the lack of burnable fuels, burn personnel moved to Block H. Ignition began on Block H at 1515 with 2 teams. One group moved northwest along the fence. The other ignited around the corral, proceeded south then west along the wing fence. The ignition teams continued perimeter ignition and met due west of the corrals at 1740. Interior strips were utilized to facilitate burn coverage.

4/23/04 Blocks F and G were ignited as one unit. At the NW corner of Block G, two ignition teams started the test fire at 1145. By 1400, both teams reached the mowline between Blocks. The plateau team tied the west line to I-94 by 1700; at about the same time, the Fryburg Road team reached the SE corner of Block F. Perimeter ignition was completed at 1740, midway between the SE and SW corners of Block F.

Fire Monitoring

Seven long-term fire monitoring plots are located within the I-94 and Southeast burn units. None of the 4 plots burned in the I-94 section, dominated by crested wheatgrass. Three plots burned in the Southeast section dominated by Kentucky bluegrass and green needlegrass. Immediate postburn severity measurement categorized 29% of the area as “lightly burned” and 71% as “moderately burned”. The substrate had a value of 100% “lightly burned”.

This means that most all of the standing vegetation burned leaving approximately 2 inches of stubble. In the horizontal fuel, most of the litter was consumed and the duff layer was largely unaffected. These plots have been measured on 4 previous occasions preceding the 1999 and 2000 fires. These plots will be read 1, 2, 5, and 10 years after this fire to determine vegetation changes.

Smoke column, Block G

Smoke Monitoring

Because of northwest winds during the first operational period and westerly winds during the second, holding resources along the southern and eastern perimeters of the burn unit were impacted by smoke. Fireline visibility ranged from a half mile to a mile with good fireline visibility. Smoke blew away from Highway 377 and only lightly impacted the road leading to the maintenance yard. The National Weather Service predicted very good smoke dispersal for the day with mixing heights at 9000 feet above ground level. Once the fire backed away from the fireline, visibility increased dramatically and smoke impact along the fireline decreased.

Conclusions

Visual estimate of the Blocks F,G, and H indicated that between 70 and 90% of the area burned indicating that a 50%-85% fuel load reduction was met. In Block A, minimal fuel loading inhibited fire spread and the fuel load reduction objective was not met. The vegetation objectives will be monitored over the course of two 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.

Objective	Achieved or Not	Time Frame
fuel load reduced by 50-85%	met in F, G, H; not met in A	immediate postburn
increase native cover by 20%	to be determined	2 years postburn
decrease non-native cover by 20%	to be determined	2 years postburn
limit hardwood mortality to < 10%	no hardwoods included in fire area	

Wetline on the Plateau flank, Block H