Badlands National Park
Tick Draw Prescribed Fire Monitoring Report

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Black Hills Fire Use Module

Burn Unit Summary

Tick Draw burn unit encompasses approximately 1137 acres in the northwest corner of Badlands National Park. The unit is bounded by Sage Creek on the west and Sage Creek Road on the south, the bison corral gravel access on the east and the national park/national grassland boundary on the north. The unit is predominantly native, mixed grass prairie on uplands and slopes with occasional junipers. The terrain is interrupted by numerous woody draws. The burn unit generally slopes south and west and lies between 2,400 and 2,900 feet.

October 3, 2005
Size: 1137 acres
Vegetation type: Native, mixed-grass prairie
Personnel:

Burn Boss: Eric Allen
Ignition Specialist: Chris Moore
Holding Specialist: Steve Ipswitch
Fire Monitors: Andy Thorstenson, Katie Johnson, Brandon Oberhardt (trainee) and Tyler Schmitt
Holding Resources: 8 Type 6 NPS/USFS engines, 1 Water Tender, and 4 ATVs

Objectives

The objectives of the Tick Draw prescribed fire include:

1. Burn 75-95% of project area.
2. Increase relative cover of native grasses by 10%, 2-year post-burn.
3. Increase relative cover of native forbs by 10%, 2-year post-burn.
4. Increase new stem density of native woody and shrubby species by 20%, 2-year post-burn.
5. Maintain survival of 3-5 year age class of native woody and shrubby species, 5-year post-burn.

Weather Observations

9/16/04	Temperature		Dew		Wind		
Time	Dry	Wet	Point	RH	Speed	Direction	Comments
0630	45	41	37	72%	7-10	N	Steady winds/clear to the east
0830	54˚	45˚	36˚	50%	5-8	E	Clearing-scattered clouds
0900	56˚	45˚	33˚	42%	13, g-18	NE	Ridgetop winds Fdfm=10%
1000	59˚	47˚	32˚	36%	5-8, g-10	NE	Scattered clouds, cloud bank to the SE Fdfm=8%
1100	59˚	47˚	32˚	36%	6-8, g-12	E	Transport E/NE , slight S influence Fdfm= 8%
1200	63˚	54˚	57˚	47%	0-3, g-6	E-NE	1140 clouds move over E side offire Fdfm= 11%
1300	60˚	49˚	39˚	45%	6-8, g-10	NE	Clouds holding 1205 entire RX unit shadowed by cloudsFdfm=11%
1400	60˚	49˚	39˚	45%	8, g-14	E	Clearing S horizon Fdfm= 11%
1500	60˚	49˚	39˚	45%	6-8, g-10	NE	Clouds minorly breaking up Fdfm=11%
1600	60˚	49˚	39˚	45%	9, g-14	E	Clouds holding
1700	58˚	48˚	39˚	49%	8-12, g-14	NE	Fdfm=12%
1800	57˚	47˚	37˚	48%	10-12, g-16	NE	50% cloud cover Fdfm=12%

Fdfm= fine dead fuel moisture

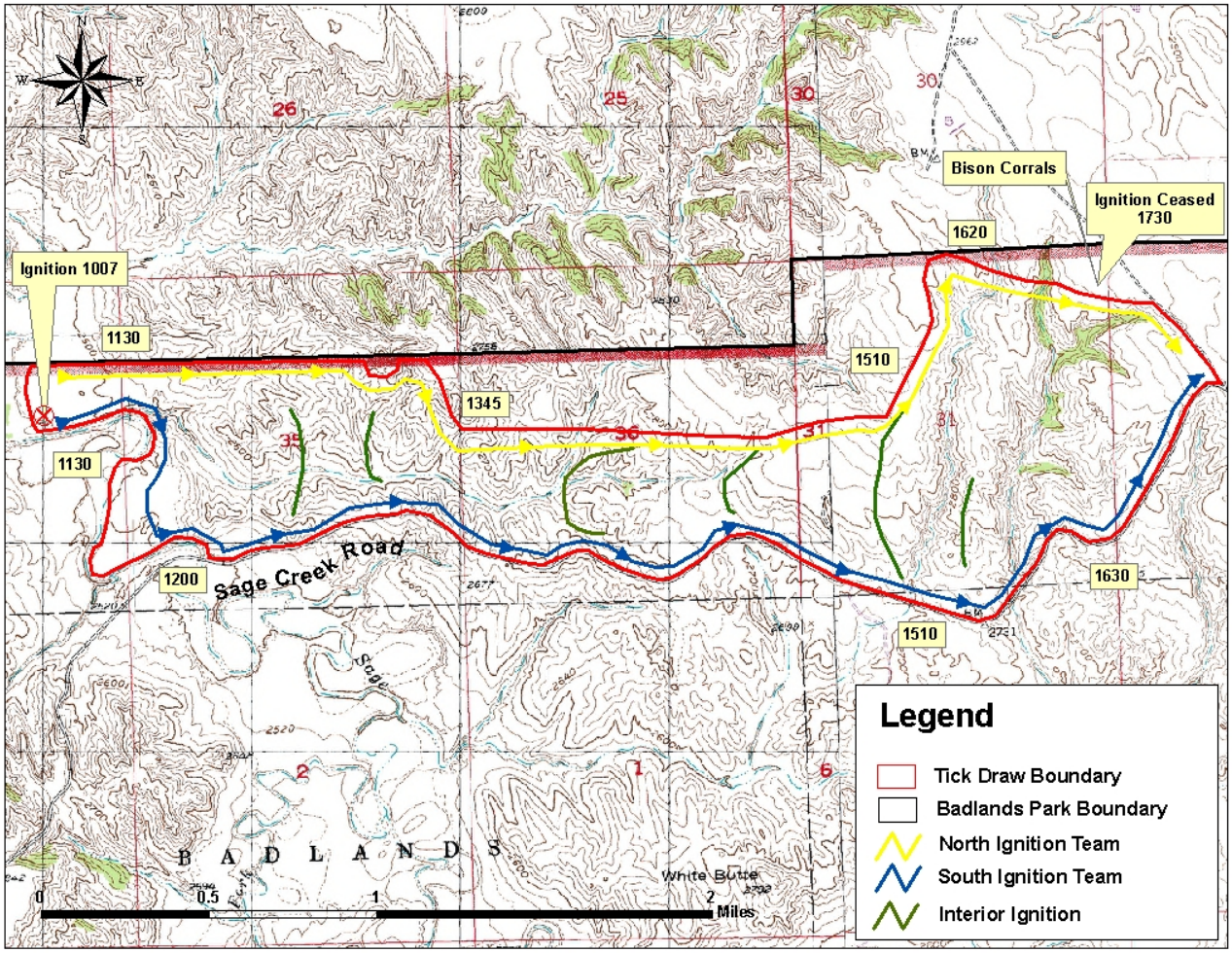
Fire Behavior Observations

Time	Location	Spread Direction	Fire Type	ROS*	FL	Comments
1007	SW Sage Ck	All	B, H, F	1	0-2’	Sparse, green fuels
1315	North line	S-N	B, H	1.5	12-18”	N winds occasional
1410	North line	S	H	30	8-10’	NE aspect; N winds
1500	Center of unit	NE	B	2	4-12”	Variable fuels; E aspect
1530	FMH plot area	S-W	H, F	6.5	3-5’	Funneled winds from N
1545	FMH plot area	S-W	H	30	18-24”	Same as above
1600	FMH plot area	W	H	8	2-3’	Fuel model 5
1610	FMH plot area	W-SW	H, F	5	2-3’	N slope
1620	FMH plot area	W-SW	H, F	15	2-3’	Upslope spread; 16% slope
1700	Center of unit	S	H	15	0.5-2’	Continuous fuel; N aspect

* ROS (rate of spread) in chains per hour

Fire behavior observations were recorded periodically as fire progressed through the Tick Draw burn unit. Rate of spread (ROS) and flame lengths (FL) were documented at numerous random locations. Additionally data was collected at 1 Kentucky bluegrass plot (POPR), 2 plum shrubland plots (PRAM) plots and 3 western wheatgrass plots (AGSM). Observations were made in native and non-native, mixed-grass fuels (fuel model 1) as well as native shrub fuels (fuel model 5). The most intense fire behavior was observed before cloud cover arrival at 11:40. Once clouds shadowed the Tick Draw RX Unit, fire behavior drastically dropped. This slowed ignition, lengthening the operation until dusk. Between 13:00 and 16:00 the weather held steady at 60° and 45%RH with winds out of the east and northeast. Fire behavior reflected this moderate weather. Topography and fuels greatly increased fire behavior in drainages.

Fire Progression



The Tick Draw test fire was started at 10:07 in the NW corner of the unit. From the test fire site two ignition teams proceeded in different directions, one east and one south. As igniters worked from their starting point, the two flanking fires grew into one another. When the southern igniters turned the corner burning along Sage Creek Road, topography and an east to northeast wind prevented the two fires from growing into one another. Perimeter ignitions were completed at dusk, SW of the buffalo corrals. Chris Moore burned out the interior of the western half of the unit. As the igniters continued east of the dog town, fire monitors completed the interior burn out. Over night the unit received heavy precipitation. The following morning it continued to rain and only a few smokes were observable in the heavily wooded drainages.

Biomass and Soil Moisture Sampling

Type	Sample size	Fuel Loading	Average Fuel Loading	Soil Moisture	Average Soil Moisture
Western wheatgrass	9	1.11 tons/acre	1.27 tons/acre	4.3%	7.7%
Kentucky bluegrass	3	1.49 tons/acre		13.6%	
Wild plum	6	1.20 tons/acre		5.3%	

Note: 1 soil and 3 biomass samples were obtained near each plot.

Fire Monitoring

Six long-term monitoring plots (FMH) are located within Tick Draw burn unit. All six burned 10/3. Post-burn severity measurements in Kentucky bluegrass prairie (**GPOPR1D01-1 plot**) showed: 86% of the vegetation as moderately burned and 14% as lightly burned. Substrate severity measurements showed: 100% as lightly burned. Post-burn severity assessments in Western Wheatgrass mixed-grass prairie (**GAGSM1D01-3 plots)** showed: 48% of the vegetation as moderately burned, 24% as lightly burned, 14% as scorched, and 14% as unburned. Substrate severity measurements showed: 62% as lightly burned, 24% as scorched, and 14% as unburned. Post-burn severity assessments in Chokecherry and Plum shrublands (**BPRUN1D05-2 plots)** showed: 50% of the vegetation as moderately burned and 50% as lightly burned. Substrate severity measurements showed: 21% as moderately burned, 29% as lightly burned, and 50% as scorched. These plots will be read 1, 2, 5, and 10 years post-burn to document vegetation changes.

Smoke Monitoring

Throughout the day winds were steadily out of the east-northeast averaging 6-9 with gusts to 12. These conditions resulted in good smoke dispersal. Kathy Hammel was acting as a smoke observer on the SW corner of the burn at the junction of the Sage Creek Road and Sage Creek Campground. She reported short periods of heavy smoke with visibility limited to 20 meters at 14:00. The average column height was 400 feet high. The National Weather Service forecasted the clearing index at good with smoke dispersal at a mixing height of 3,500' above ground level. The presence of clouds made it difficult to discern mixing height.

Conclusions

Observing the unit the following day, 90% of the area was burned. On south and west-facing slopes, sparse fuels inhibited fire spread. On the western third of the unit fire spread was slow due to the prescribed fire that took place in 2004. Also, heavy grazing by bison affected grass densities, slowing fire growth. Fire activity was highest on north and east-facing slopes due to slightly increased fuel accumulation and fuel continuity. This was especially true on shrub and Juniper stands in the eastern half of the unit. Heavy cloud cover decreased expected fire activity. Vegetation monitoring will be continued at six FMH plots to determine whether or not project-specific objectives were achieved.

In the future, fuel loading data should be used to determine if conditions are appropriate for the application of prescribed fire. It may be that fuel loading less than 2 tons/acre is too low to support adequate fire spread.