Knife River Indian Villages
Sakakawea Prescribed Fire Monitoring Report

Prepared by Andy Thorstenson and Kevin Rehman

Introduction

The Sakakawea prescribed fire is a 252 acre unit comprised of Green Ash riparian forest, non-native grass prairie, and riparian bottomland. It is located along both sides of the Knife River north of the Visitor Center. The boundary of the burn area consists of Highway 37 on the west, a mow line on the Park boundary on the north, east and southern perimeters, and the river on the southwest perimeter. Ignition occurred during the operational periods of October 22 and 23, 2001.

Overhead personnel for the Sakakawea burn consisted of Burn Boss Doug Alexander with Beth Card acting as Burn Boss Trainee. Resources were from The National Park Service, The United States Forest Service, US Fish and Wildlife Service, and state agencies from North Dakota.

Objectives

The Burn plan stated these as primary resource objectives for the burn:

- Reduce 1-hr dead and down fuels in prairie/old field by at least 75-85% immediate postburn.
- Reduce dead and down (1, 10, 100-hr) fuels under hardwood canopy 00-50% immediate post burn
- Reduce dead and down (1, 10, 100-hr) fuels under hardwood canopy 70-80% two-year post burn.
- Decrease non-native herbaceous frequency and relative cover by at least 25% one-year post burn
- Limit overstory tree mortality to less than 20% 2 year post burn.

General goals for the prescribed fire were to decrease decadent thatch to create openings for young, more nutritious vegetation growth that should improve native perennial forb vigor and wildlife foraging habitat in the area. The burn will also create small openings in the hardwood canopy and fertile beds of nutrient-rich ash to promote new deciduous regeneration. Fire behavior and effects will be closely monitored using FMH (Fire Monitoring Protocols) protocols.

Summary of Events

Prior to the day of the burn, personnel from Knife River constructed a mow line that followed the fence line of the park boundary along the perimeter of the burn unit. Two portable water tanks and pumps were placed at access points near the burn unit.

Three long-term fire effects monitoring plots were installed randomly within the burn unit prior to the burn. Relative cover of native and non-native grass, forbs, and shrubs were sampled during the peak growing season in July. Biomass, and soil moistures were sampled within the monitoring plots one day prior to the burn. Fuel moistures were sampled one week prior to the burn.

The Sakakawea prescribed fire required two operational periods of ignition. A briefing was conducted for all personnel at 0800 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.

Weather Observations

Monitoring of weather conditions for the Sakakawea Prescribed Fire began in the morning of each operational period to obtain a spot weather forecast from the National Weather Service. Spot weather forecasts were received prior to morning briefings. Once compliance was met with weather parameters within the burn prescription ignition could begin. As of 0900, observations were generally taken every half hour until ignition was completed for the day. Observations were broadcast on the hour over the command channel for all fire personnel. Observed and predicted weather conditions are summarized in Table 1.

Table 1

10/22/01	Temperature		Dew Point		Wind		
Time	Dry	Wet		RH	Speed	Direction	Comments
1030	51	43	34	53	0-3	SW	Cloud Cover 80%
1100	53	44	34	49	2-4 G 5	WSW	
1200	53	44	24	49	4-6 G 8	WNW	
1245					G12	NW	
1400	64	48	31	29	10-15 G 19	N/NW	
1500	63	47	30	28	7-10 G 15	N/NW	
1600	59	45	29	32	5-7 G 9	N/W	
1625	59	45	29	32	5-7 G 9	N	
1725	57	44	29	34	6-8 G 10	NW	

10/23/01	Temperature		Dew Point		Wind		
Time	Dry	Wet		RH	Speed	Direction	Comments
0930	38	35	31	76	E/NE	2-4	CC 90%
0950	38	35			SE/NE	0-3	
1000	39	36	32	76	E	5	
1130	39	36	32	76	NE	2-4 G 7	CC 100%
1200	40	38	36	84	NE	2-5	

Shaded cells represent weather within prescription parameters.

Fire Behavior Observations

Fire behavior observations were taken regularly during each day in different fuel types. Fire behavior was recorded on 2 fire effects plots within the burn unit. Fire behavior observations are summarized in Table 2.

Table 2

Date	Time	Location	Fire Type	ROS	FL	Comments
10/22	1205	Ignition Point	B	0.5ch/hr	3-8”	
10/22	1235		B	0.5ch/hr	6”-2’	
10/22	1250		F	-	4’-6’	
10/22	1346	East Line	F	0.3ch/hr	2’-3’	
10/22	1430		F	5 ch/hr	4’-5’	
10/22	1540		H	180 ch/hr	10’ - 15’	
10/23	0950	SW Corner	B	1ch/hr	6” – 1.5’	
10/23	1035	Arch exclusion near Highway	B	.5 ch/hr	6” – 2’	
10/23	1145	Wooded w/ BRIN	H	-	10’ – 15’	
10/23	1220	Plot 5	B w/ H	5 ch/hr	4’ – 10’	
10/23	1220	Plot 5	H	20 ch/hr	3’ – 4’	
10/23	1300		B	0.25 ch/hr	2” – 4”	Rain/Snow

ROS = rate of spread measured in chains per hour (1 chain = 66 feet or 20 meters)

Biomass and Soil Moisture Measurements

Fuel loading and soil moisture samples were taken at the long term monitoring plots on the day before the burn. Three samples of a known area were clipped to determine biomass or fuel loading by tons per acre. The sample fuel loading was on average 4.52 tons per acre and varied from 4.31 to 4.93 tons/acre in the prairie areas. Three soil moisture samples were taken within 5cm of the surface at each of the five plots. Samples were weighed and dried to obtain a mean soil moisture for the unit. The average soil moisture was 53.30% in the prairie ranging between 45% and 65%..

Fire Monitoring

Three long-term fire-monitoring plots are located within the Sakakawea unit. The three plots are Green Ash Forest Plots. Two of the three plots were read immediately post-burn to determine burn severity of vegetation and substrate (litter and soil). Due to logistical reasons (snow) the Fire Effects crew were prevented from reading immediate post-burns for the last plot. These plots, however, will be read 1, 2, 5, and 10 years after treatment of fire to determine the immediate, short, and long term ecological and vegetative effect fire had on this burn unit.

Conclusions

The long-term health of ecosystems is the focus of the prescribed burning program here in the Northern Great Plains and at Wind Cave National Park, therefore certain criteria need to be assessed.
Some objectives are immediately measurable such as severity immediate post-burn. 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.

Resource Objective	Monitoring Status
Increase native grass and forb cover.	Fire effects plots will be read in the peak growing season 1,2,5, & 10 years postburn
Restore the natural role of fire to the ecosystem.	Fire effects plots will be read in the peak growing season 1,2,5, & 10 years postburn
Reduce fuels in the deciduous understory in the woody draws.	Fire effects plots will be read in the peak growing season 1,2,5, & 10 years postburn
Reduce 1-hr dead & down fuels in prairie by at least 70% immediate postburn	Visual estimates showed at least 50% of the thatch was removed

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