

Knife River Indian Villages
National Historic Site
North Prairie Prescribed Fire Monitoring Report

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Introduction

The North Prairie burn unit is a 178-acre unit consisting of mixed grass prairie with a few small pockets of green ash and snowberry thickets in the drainages. The unit is bounded by mowed line on the ridge that drops down to the Missouri River on the east side, and mow lines on the north, west, against the park boundary fence and south sides. The test burn ignition occurred at 1035 on September 17th in the southeast corner of the project area. Following the successful test burn, the rest of the unit was ignited starting at the southeast corner of the burn, blacklining initially the mow lines and then spot firing the interior and ceased at approximately 1430 with completion of the operation.

Overhead personnel for the North Prairie burn consisted of Burn Boss Doug Alexander, Ignition specialist Shaun Larson, and Holding specialist Eric Allen, other holding forces consisted of six Type 6 engines, one ATV w/tank, and a 1,500 gallon water tender. Additional resources included various personnel from the National Park Service, The Nature Conservancy, and the US Fish and Wildlife Service.

Objectives

Objectives stated in the prescribed burn plan are as follows:

- Reduce 1-hr. dead and down fuels in prairie/old field by at least 75-85% immediate post burn.
- Decrease non-native herbaceous frequency and relative cover by at least 25% one year post burn.

Summary of Events

Prior to the burn, employees of Knife River Indian Village National Historic Site prepared for the burn by mowing a line along the whole perimeter of the burn unit. In addition they established four porta-tanks: two on the northeast corner and two on the southeast corner of the burn unit.

Two long-term fire effects monitoring plots were installed at random points within the burn unit prior to the burn. Biomass and soil moisture samples were collected within the monitoring plots the day of the burn.

A briefing was conducted at 0800 Mountain Standard Time 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. Prescription criteria were met and ignition commenced at 1035 and ceased at 1430. Post-burn evaluations on the fire effects monitoring plots were completed immediately after the burn.

Weather Observations

Monitoring of weather conditions for the North Prairie Prescribed Fire began at 0700 and continued until 1500. Observations were taken every hour on the hour and broadcast over the radio on the tactical channel. On September 17th, 2002 the temperatures during ignition ranged from 55 to 75 degrees Fahrenheit. Winds were predominantly out of the northwest with a maximum wind speed of 17 mph at eye level. Observed and predicted weather conditions are summarized in Table 1.

Table 1. Weather Conditions Observed on 9/17/02

Condition	Temperature	Relative Humidity	Wind Speed (mph)	Wind Direction	1-Hr. Fuel Moisture
Prescription	NA	20-60%	0-12	ANY	4%
Predicted	48-72	Min 32%	10-15	NW	6%
Observed	55-75	46-31%	5-17	NW	6-8%

Ignition Pattern

Ignition began at 1035 with a test burn in the southeast corner of the burn unit. The ignition team began lighting backing/flanking fires near the southeast corner. After the test burns, ignition teams split, one team headed west along the southern perimeter and another team north along the eastern perimeter bring backing/flanking fire with them. At 1300, the ignition team heading north along the eastern perimeter reached the northeast corner of the unit and then headed west along the northern perimeter line where they reached the northwest corner at 1320. Meanwhile at approximately 1315 the ATV drip torch lit off portions of the interior that had not yet burned. Spot fires were lit every 100 feet in a north/south direction. Parallel lines of spot fires were lit for a majority of the unit. Only about small area against the western burn line burned with head fire. Ignition was completed at 1430. (See map 1.)

Fire Behavior Observations

Fire behavior observations were taken regularly during the day. A majority of the burn unit burned as a backing/flanking fire using backing and spotting ignition methods.

For backing fire, flame lengths ranged between 4 inches and 3 feet. Rates of spread for backing fire ranged from 2 to 3 chains per hour. Due to safety concerns, only one head fire observation was taken. The flame lengths measured at 3 to 7 feet. Rates of spread for head fire was measured at 60 chains per hour.

Time	Fuel Model	Fire Type	Rate of Spread	Flame Length	Flame Zone Depth	Comments
1045	1	Backing w/ little flank	2 ch/hr	4'' – 1'	6''	Shortgrass/native partial consumption
1140	1	Backing/ some flank	3 ch/hr	6'' – 2'	6'' – 8''	Western wheat/ not a lot of thatch
1300	1	Backing	2.5 ch/hr	4'' – 1.5'	6''	Fair consumption of Kentucky bluegrass
1330	1	Head w/ flank	60 ch/hr	2' - 7''	5 meters	
1330	1	Backing	3 ch/hr	4'' – 1'	4''	
1400	1	Backing	2.5 ch/hr	1.5' – 3'	4''	Shifty winds
1400	1	Backing	3 ch/hr	1.5' – 3'	4''	Shifty winds

Biomass, Fuel and Soil Moisture Measurements

Biomass samples with in this burn unit showed that the average ton per acre in mixed grass prairie in the burn unit was 2.84 tons per acre. Soil moisture samples were collected at both plots and the mean soil moisture averaged 23.67%

Smoke Monitoring

Smoke was not monitored on this burn. Smoke volume was light and moved downstream into the Missouri River drainage. Smoke was monitored and observed to loft up and followed the Missouri River Channel to the southeast with no impacts to the adjacent property owners or the town of Stanton.

Fire Monitoring

Two long-term fire monitoring plots are located within the North Prairie unit. Both plots are native grass, fuel model one. These plots were read immediately after the prescribed fire and will be read again 1, 2, 5, and 10 years after the initial 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 in the Northern Great Plains and at Knife River NHS, therefore certain criteria need to be assessed. Some objectives are immediately measurable such as fuel loading reduction 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.

Burn Objectives	Status
Reduce 1-hr. dead and down fuels in prairie/old field by at least 75-85% immediate post burn.	Ocular estimates for reduction of 1-hr. dead and down fuels in native mixed grass prairie were between 70-90% Ocular estimates for reduction of 1-hr. dead and down fuels in non-native grass were between 40-60%
Decrease non-native herbaceous frequency and relative cover by at least 25% one year post burn.	Objectives will be determined once one year post burn monitoring has been completed.