

**Knife River Indian Villages  
National Historic Site  
Big Hidatsa FY05 Artifact Research Prescribed Fire Monitoring Report**

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Northern Great Plains Fire Effects Monitors



**Burn Unit Summary**

The Artifact Research Rx was conducted in order to document and compare surface temperatures and exposure durations associated with the three main firing methods (backing, flanking, and heading). Research plots were located in a non-native grassland (fuel model 1) dominated by smooth brome (*Bromus inermis*). Six 20-m<sup>2</sup> plots were burned in total. At each site (Youess and Poly), 1 plot was burned using head fire, 1 was burned using flanking fire, and 1 was burned using backing fire. A Campbell Scientific six channel data logger was utilized for data collection.

Observations were made to evaluate spalling, cracking, and other damage to surface artifacts. Temperatures and exposure durations will be related to pre and post-burn observations made by the MWR archaeological team.

**28 April 2005**

**Unit Layout:** Three 20-m<sup>2</sup> at Youess; three 20-m<sup>2</sup> plots at Poly

**Aspect:** Flat

**Elevation:** 1670 - 1710 feet

**Vegetation Type:** predominantly non-native, mixed grass dominated by smooth brome

**Personnel:**

Burn Boss: Dan Morford, Tara Pickens (T)

Ignition Specialist: Chris Moore (Yellowstone Module), Rod Skalsky (T)

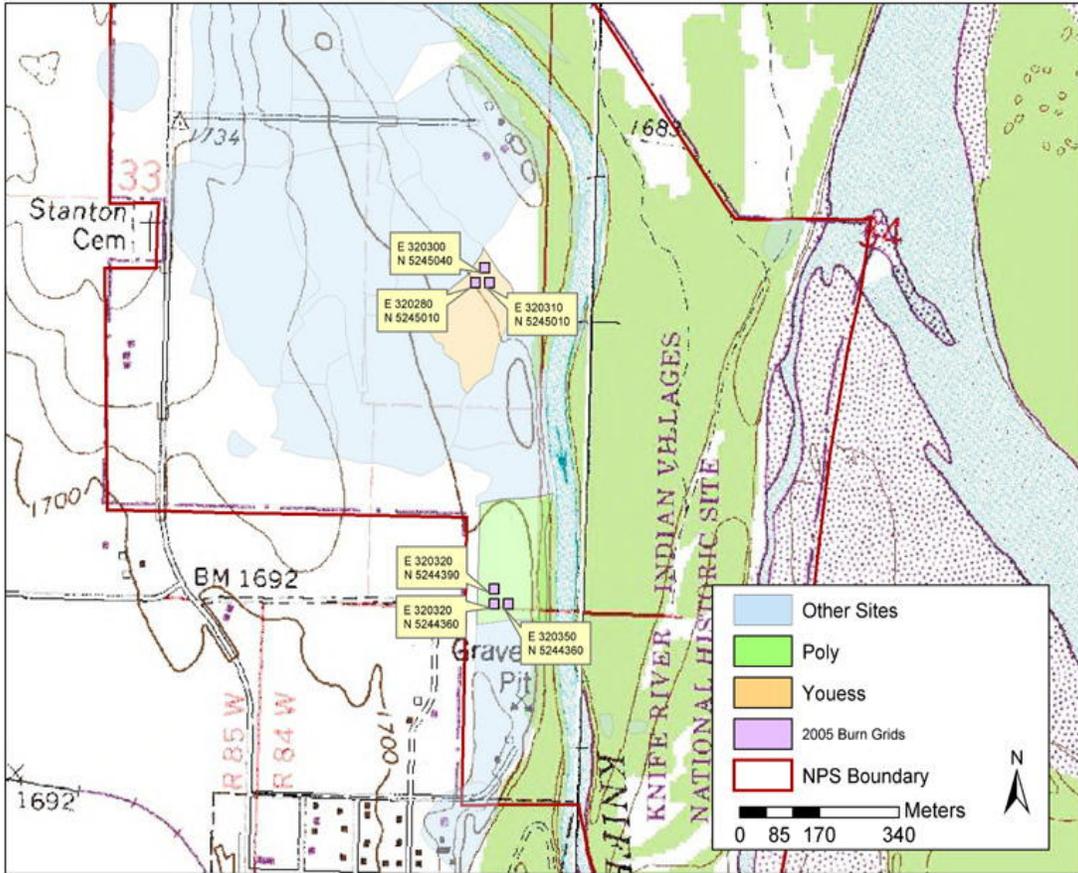
Holding Specialist: Mark Smith

Fire Monitors: Tyler Schmitt and Katie Johnson

Engine Bosses: E-6621: Katie Horner, John Moeykens (T); E-7621: Craig Hansen; E-7199: Cole Irvin; E-7197: Justin Repine

4 Type 6 Engines

## Artifact Research RX: Unit map



### Objectives

Objectives of Artifact Research RX include:

1. Reduce 1-hr dead and down fuels by 95% immediate post-burn (averaged over the entire burn unit).

### Weather Observations

4/28/05 Time	Temperature		Dew Point	Winds			Comments
	Dry	Wet		RH	Speed	Direction	
0730	35°	30°	20°	55	8-10, g 18	NW	Clouds approaching
0900	38°	31°	17°	43	10, g 17	NW	100% cloud cover
1000	40°	32°	17°	38	9-11, g 16	NW	100% cloud cover
1100	40°	32°	17°	38	10-12, g 19	NW	100% cloud cover
1200	44°	35°	20°	37	10-12, g 18	WNW	95% cloud cover

## Fire Behavior Observations

Fire behavior observations were recorded periodically as fire progressed through each of the 6 research plots. Rate of spread (ROS) and flame lengths (FL) were documented at multiple locations within each plot complex. Observations were made in mixed grass fuels (fuel model 1) dominated by smooth brome.

Time	Location	Fire Type	ROS	FL	Comments
1030	Youess, SE plot	B	2	1-2'	100% clouds; backing fire plot
1040	Youess, SE plot	B	2	1-2'	Backing fire plot
1055	Youess, SW plot	F	2.5	2-3'	Flanking fire plot
1115	Youess, N plot	H	40	2-5'	Head fire plot
1155	Poly, SE plot	B	2	0.5-1'	100% clouds; backing fire plot
1205	Poly, SW plot	H/F	20	2-4'	Flanking fire plot
1210	Poly, SW plot	F/B	4	1-2'	Flanking fire plot
1220	Poly, N plot	H	40	2-5'	Head fire plot

ROS= chains per hour (c/h)

## Biomass and Soil Moisture Sampling

Research Site	Sample size	Fuel Loading	Average Fuel Loading	Soil Moisture	Average Soil Moisture
Youess	3	2.68 tons/acre	2.28	19.6%	19.1%
Poly	3	1.89 tons/acre		18.6%	

## Fuel Moisture Sampling

Research Site	Live/Dead	Sample size	Fuel Moisture Content FMC (%)	Average FMC (%)
Youess	Live	3	218.2	219.6
Poly	Live	3	221.0	
Youess	Dead	3	9.6	9.8
Poly	Dead	3	10.0	

## **Fire Progression**

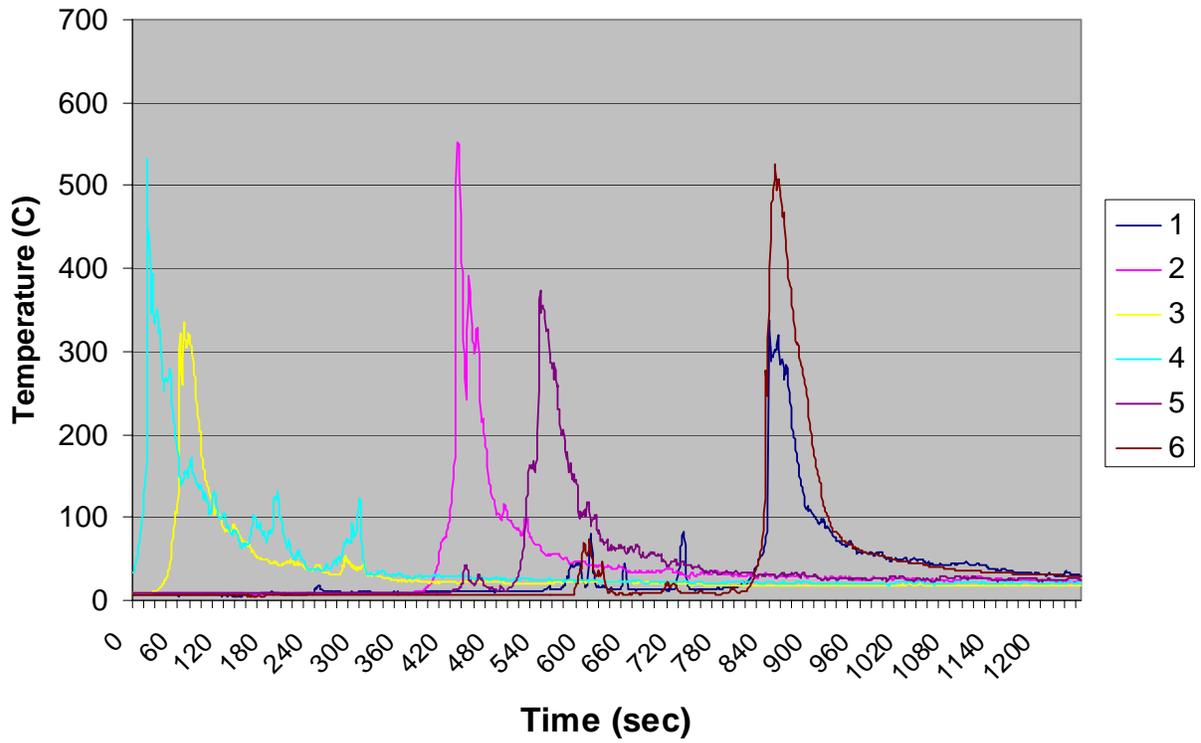
***Youess Block/SE plot:*** Ignition operations began in the southeast corner of this plot at 1027. The corner was quickly secured with backing and strip head firing. The remainder of the unit burned with a slow, backing fire. This plot was completed at 1105. ***Youess Block/SW plot:*** Ignition operations began at 1050. The southeast corner of this plot was likewise secured with backing and strip head firing. By 1110, the remainder of this plot was consumed with a flanking fire. ***Youess Block/N plot:*** Firing began at 1110 and was finished by 1115. The southeast corner was secured using backing and strip head firing, then the remainder of the unit was burned with a head fire.

***Poly Block/SE plot:*** Ignition operations began in the southeast corner of this plot at 1150. The corner was quickly secured with backing and strip head firing. The remainder of the unit burned with a slow, backing fire. This plot was completed at 1215. ***Poly Block/SW plot:*** Ignition operations began at 1203. The southeast corner of this plot was likewise secured with backing and strip head firing. By 1215, the remainder of this plot was consumed with a flanking fire. ***Poly Block/N plot:*** Firing began at 1220 and was finished by 1225. The southeast corner was secured using backing and strip head firing, then the remainder of the unit was burned with a head fire.

## **Fire Monitoring**

The following graphs depict temperature changes over time at six thermocouplers within each plot (graphs were created by Cody Wienk, Northern Great Plains Fire Ecologist).

### Youess - Backfire



### Poly - Backfire

