

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

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Knife River Indian Villages NHS



**Artifact Research RX**

**Burn Unit Summary**

The Artifact Research Fall 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 equipped with Omega GG-K-26 thermocouples (glass braid 26 Ga. Wire) 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 September 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:** Resources from National Park Service, United States Forest Service and United States Fish and Wildlife Service Participated during the prescribed fire

Burn Boss: Chad Wimer

Ignition Specialist: Rod Skalsky

Holding Specialist: Jesse Olson

Fire Monitor: Kasha Hansen

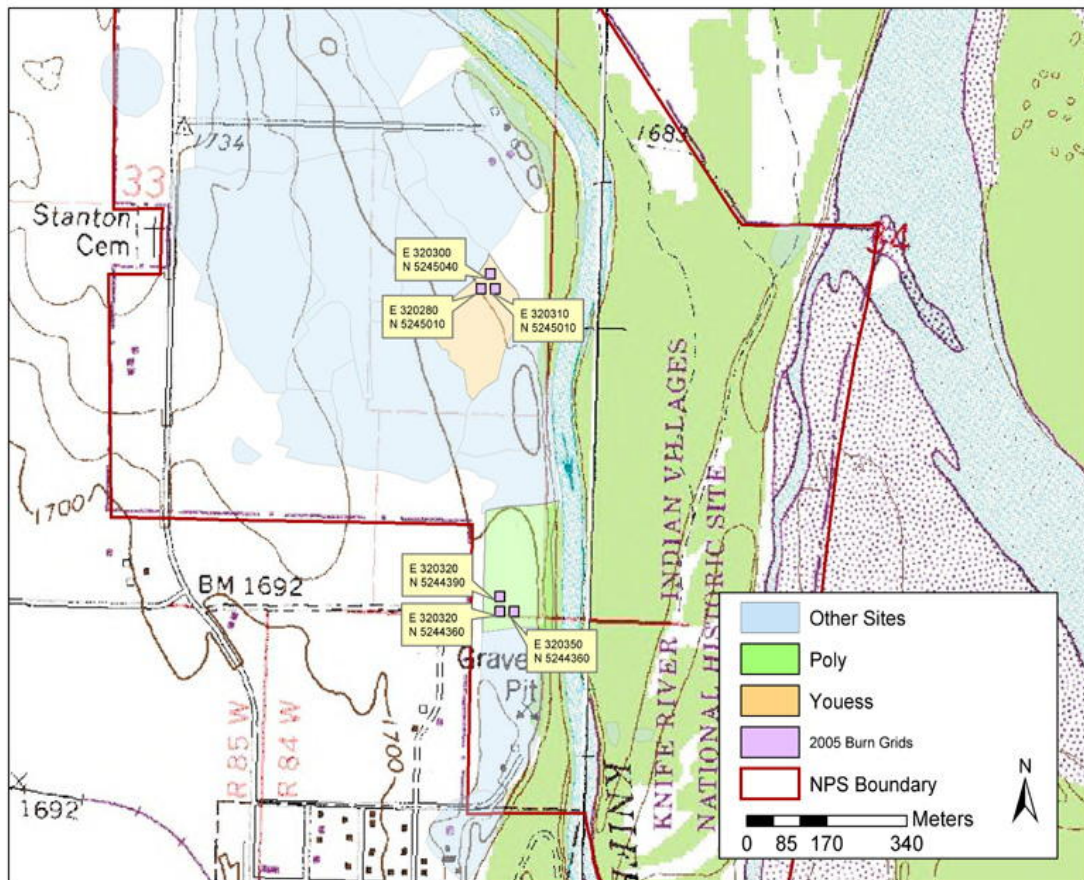
Engine Bosses: E-6621: John Moeykens (T), Eli Schumann

E-6514: Andy Beck, Justin Robinson

ATV Operator: Craig Hansen

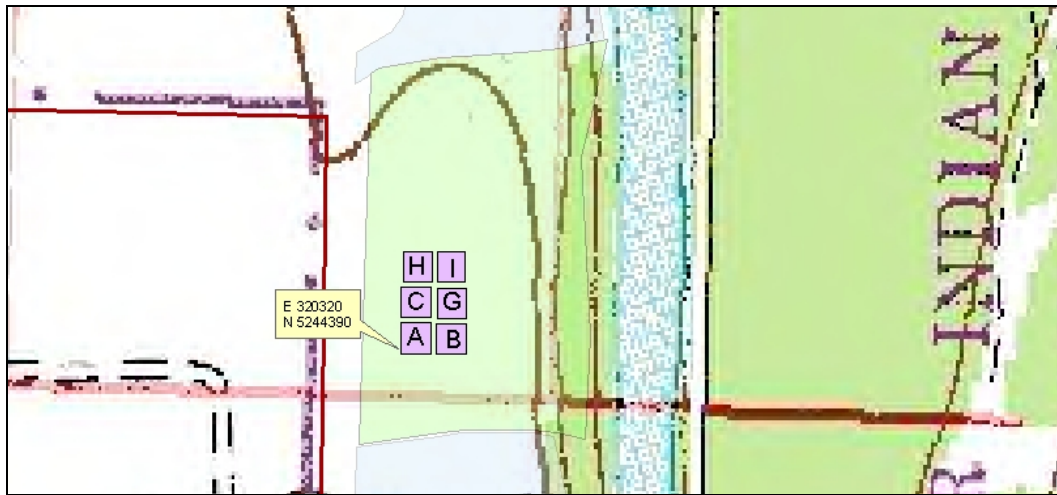
Ignitions: Chuck Folk, Crystal Kilwein

**Artifact Research RX: Vicinity Map**



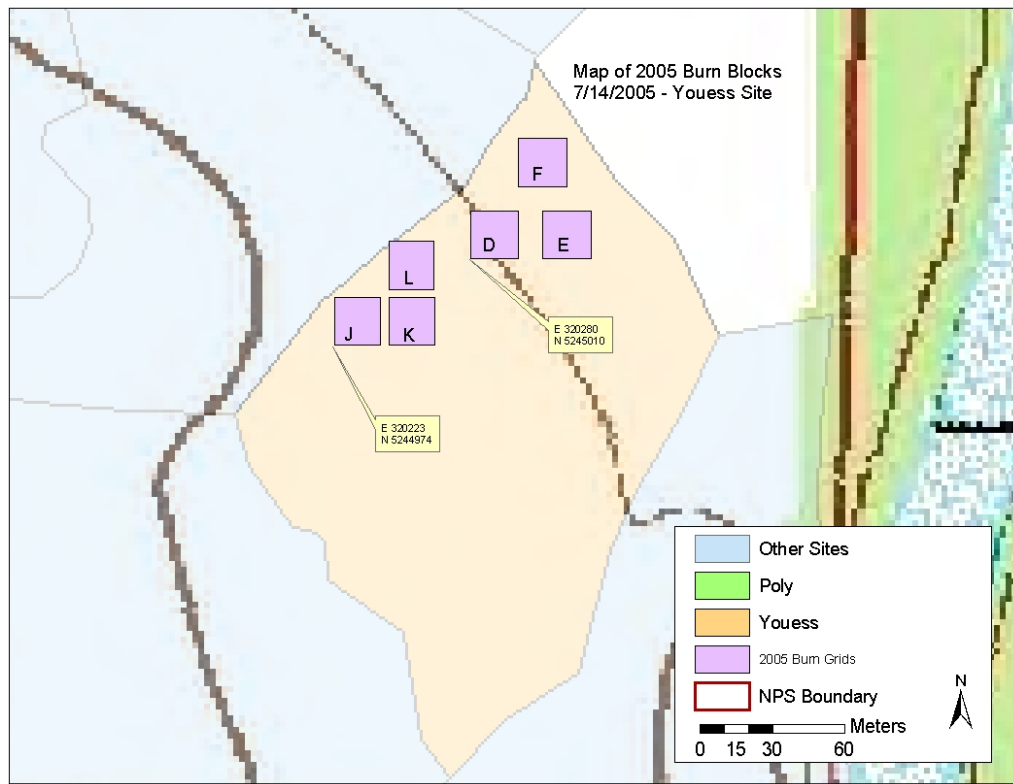
# Artifact Research RX: Unit Maps

## Poly Site



Blocks G, H and I included in September 2005 Rx

## Youess Site



Blocks J, K and L included in September 2005 Rx

## Objectives

Objectives of Artifact Research RX include:

1. Reduce 1-hr dead and down fuels by 85% immediate post-burn (averaged over the entire burn unit).

## Weather Observations

4/28/05 Time	Temperature		Dew Point	RH	Winds		Comments
	Dry	Wet			Speed	Direction	
0700	42°	39°	35°	77	4	NW	Partly cloudy
1115	56°	46°	35°	45	5, G 8-10	NW	Clear
1200	57°	46°	34°	45	5, G 8-10	NW	Clear
1230	57°	46°	34°	45	5, G 8-10	WNW	Clear
1315	57°	46°	34°	45	6, G 8-10	WNW	Clear

## 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 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
1115	Youess, K plot	B	2.7	.5'-2'	Clear; backing fire plot
1200	Youess, J plot	F	3.6	1.5'-4'	Flanking fire plot
1230	Youess, L plot	H	43.6	2'-5'	Head fire plot
1315	Poly, G plot	B	2.7	0.5'-1.5'	Clear; backing fire plot
1340	Poly, I plot	F	2.7	.5'-2'	Flanking fire plot
1400	Poly, H plot	H	90.9	1.5'-4.5'	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	2.51 tons/acre	1.86	9.87%	9.71%
Poly	3	1.21 tons/acre		9.55%	

### Fuel Moisture Sampling

Research Site	Live/Dead	Sample size	Fuel Moisture Content FMC (%)	Average FMC (%)
Youess	Live	3	59.72	138.76
Poly	Live	3	79.04	
Youess	Dead	3	13.71	25.36
Poly	Dead	3	11.65	

### Duff Depth Remaining Post Burn

Research Site	Duff Depth	Sample size	Average Depth Per Site	Average Depth
Youess	cm	15	2.52	2.77
Poly	cm	15	3.03	

### Fire Progression

***Youess Block/K plot:*** Ignition operations began in the southeast corner of this plot at 1115. 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 1200. ***Youess Block/J plot:*** Ignition operations began at 1200. The southeast corner of this plot was likewise secured with backing and strip head firing. By 1230 the remainder of this plot was consumed with a flanking fire. ***Youess Block/L plot:*** Firing began at 1230 and was finished by 1240. 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/G plot:*** Ignition operations began in the southeast corner of this plot at 1315. 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 1335. ***Poly Block/I plot:*** Ignition operations began at 1335. The southeast corner of this plot was likewise secured with backing and strip head firing. By 1350, the remainder of this plot was consumed with a flanking fire. ***Poly Block/H plot:*** Firing began at 1350 and was finished by 1340. The southeast corner was secured using backing and strip head firing, then the remainder of the unit was burned with a head fire.

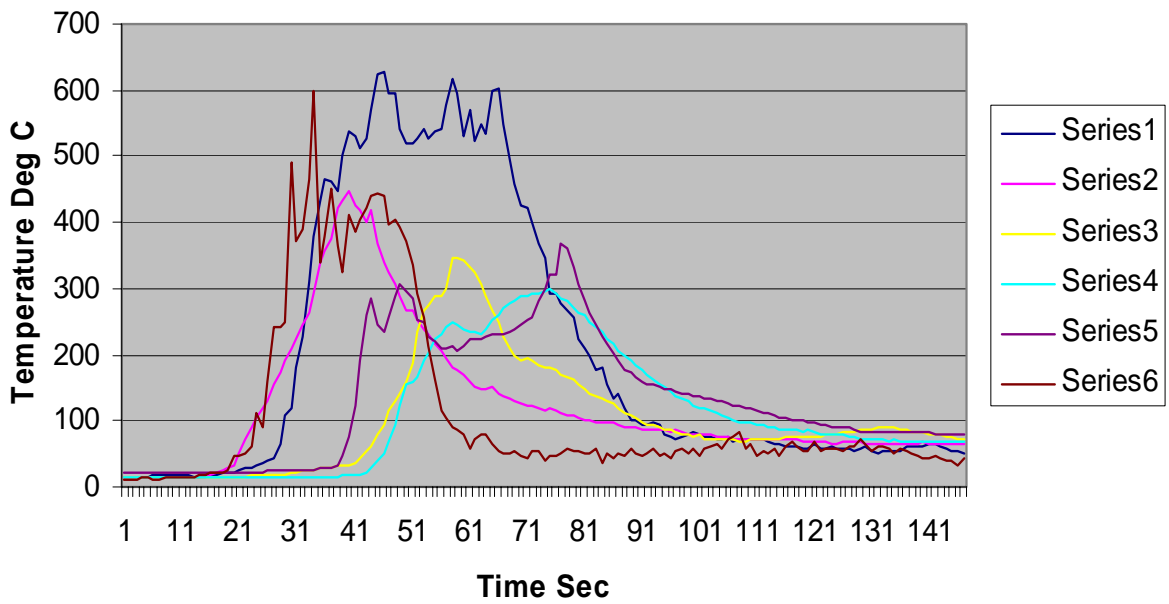
### Fire Monitoring

The following graphs depict temperature changes over time at six thermocouples within each plot (graphs were created by Rod Skalsky, KNRI Fire Program Coordinator).

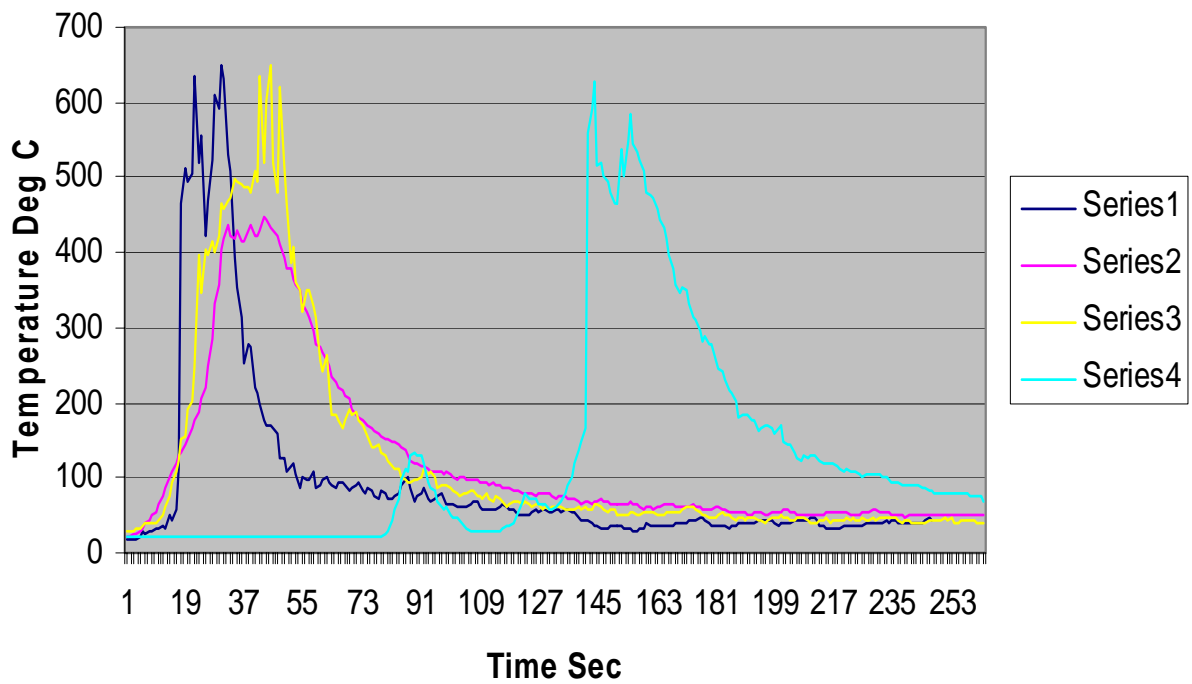
Due to problems with temperature collecting equipment, six thermocouples were not used on all plots and data was not able to be collected on backing fire plots.



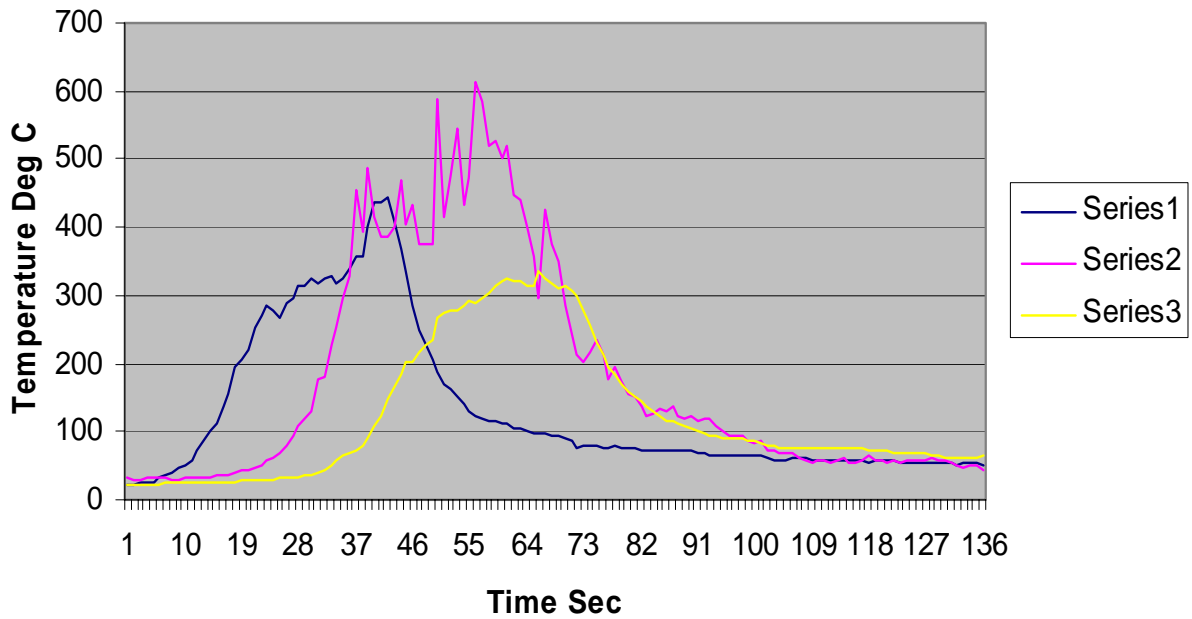
### Youess Flanking Fire 09/28/05



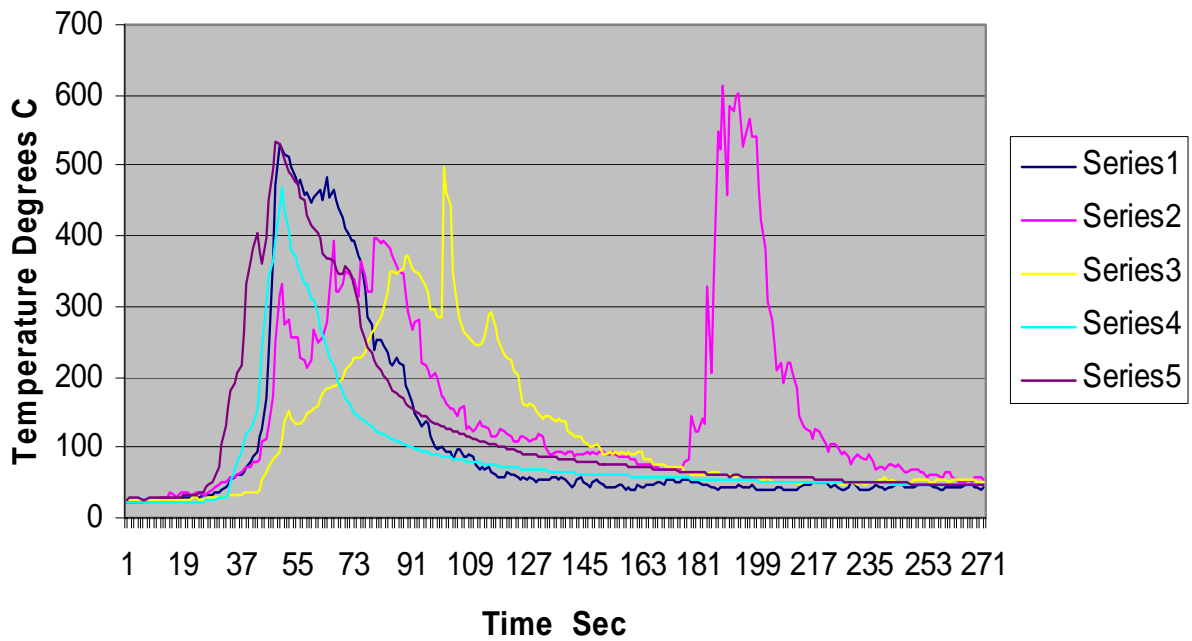
### Poly Flanking Fire 09/25/05



### Youess Headfire 09/28/05



### Poly Headfire 09/28/2005





USFS personnel watching backing fire on Poly plot G