

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

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Northern Great Plains Fire Effects Monitors

Burn Unit Summary

The Big Hidatsa FY05 RX comprised of 3 subunits. Subunits 1, 2, and 3 were 141, 75, and 19 acres, respectively. Subunit 1 was completed April 28 and subunit 2 was completed April 29. Due to smoke management concerns, prescribed fire activities were postponed on Subunit 3. Participants included personnel from Yellowstone NP, Wind Cave NP, Theodore Roosevelt NP, Knife River NHS, and USFWS.

Subunit 1 was bounded by County Road 37 on the west and County Road 18 on the south, a green ash woodland on the east and NPS boundary on the north. Subunit 2 was bounded by the Missouri River and NPS/private boundary on the east, then the North Forest Trail on the west. Subunit 1 was fragmented by a complex of archeological exclusion areas that were prepared with mowed firebreaks.

28 April 2005

Size of Subunit 1: 141 acres burned

Aspect: predominantly flat; slightly south

Elevation: 1670 - 1710 feet

Vegetation Type: predominantly native, mixed grass; non-native component dominated by smooth brome and Kentucky bluegrass

Personnel:

Burn Boss: Dan Morford, Tara Pickens (T)

Ignition Specialist: Chris Moore, 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

2 ATVs

29 April 2005

Size of Subunit 2: 75 acres burned

Aspect: flat

Elevation: 1670-1710 feet

Vegetation Type: predominantly non-native smooth brome

Personnel:

Burn Boss: Chad Weimer (USFWS), Pickens (T)

Ignition Specialists: Moore, Horner (T); Skalsky, Schumann (T)

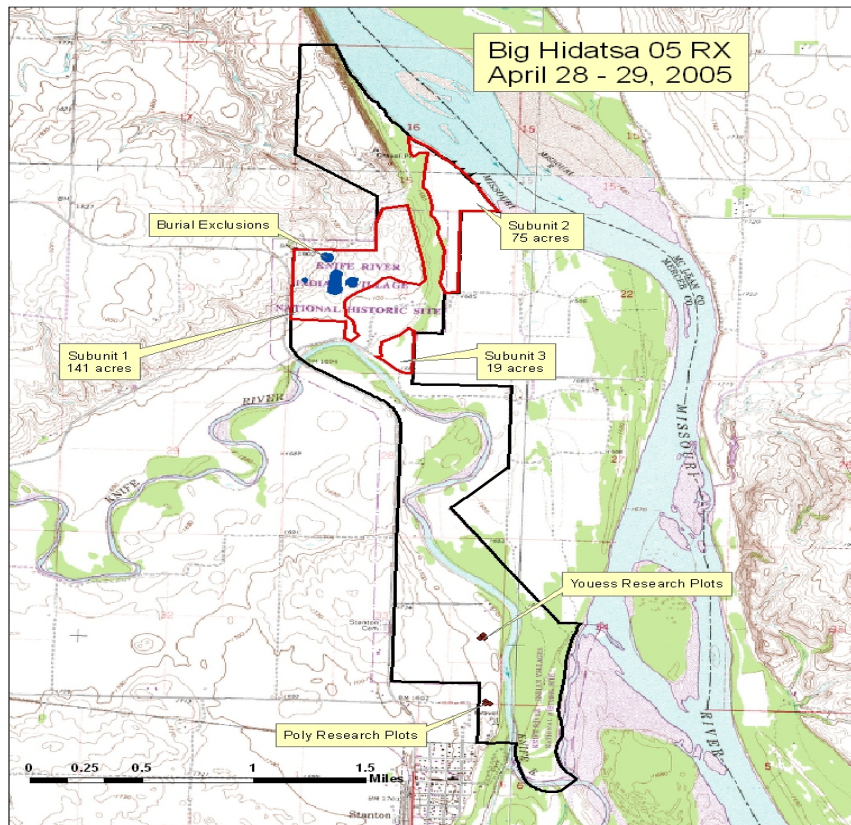
Holding Specialist: Smith

Fire Monitors: Johnson and Schmitt

Engine Bosses: E-6621: Folk (T); E-7621: Hansen; E-7199: Irvin; E-7197: Repine

4 Type-6 Engines

2 ATVs



Objectives

Objectives of Big Hidatsa FY05 RX include:

1. Reduce 1-hr dead and down fuels in prairie by at least 75-85% immediate post-burn.
2. Increase percent cover of native, warm season grasses and forbs by 20%, two years post-burn.
3. Decrease percent cover of non-native, cool season grasses by 20%, two years post-burn.
4. Restore the role of fire to the ecosystem.
5. Study the effects of fire on non-native plant species.

SUBUNIT 1

Weather Observations

| 4/28/05 Time | Temperature | | Dew Point | Wind | | | Comments |
|-----------------|-------------|-----|-----------|------|------------|-----------|-----------------------|
| | Dry | Wet | | RH | Speed | Direction | |
| 1400 | 48° | 37° | 19° | 31 | 12, g 18 | WNW | 80% cloud cover |
| 1500 | 48° | 38° | 23° | 36 | 11, g 17 | WNW | 80% cloud cover |
| 1600 | 44° | 34° | 13° | 31 | 13, g 22 | NW | 70% clouds (ridgetop) |
| 1700 | 45° | 35° | 17° | 32 | 8-10, g 14 | NNW | 60% cloud cover |
| 1800 | 43° | 34° | 18° | 36 | 10, g 20 | NNW | 30% cloud cover |

Fire Behavior Observations

Fire behavior observations were recorded periodically as fire progressed through Big Hidatsa Subunit 1. Rate of spread (ROS) and flame lengths (FL) were documented at numerous random locations and at 4 FMH plots. Observations were made in native and non-native, mixed grass fuels (fuel model 1) as well as native shrub fuels (fuel model 6).

| 4/28 Time | Location | Fire Type | ROS | FL | Comments |
|--------------|-------------------|-----------|-----|--------|-----------------------------------|
| 1350 | SE line of finger | B | 2.5 | 6-18" | Smooth brome fuels |
| 1415 | W side of finger | H | 60 | 3-5' | Strip head fire |
| 1430 | NW corner finger | F | 4 | 6-18" | Sparse smooth brome fuels |
| 1610 | Midpt of E line | B | 3 | 1.5-2' | Dense native grass fuels |
| 1630 | Midpt of E line | F | 3.2 | 2-3' | Native fuel model 6 |
| 1645 | NE corner of unit | H | 60 | 2.5-4' | Dense SCSC; upslope run |
| 1725 | FMH plot area | B | 2.5 | 1-2' | Non-native dominated fuel model 1 |
| 1810 | FMH plot area | B | 4 | 0.5-2' | Native dominated fuel model 1 |

ROS= chains per hour (c/h)

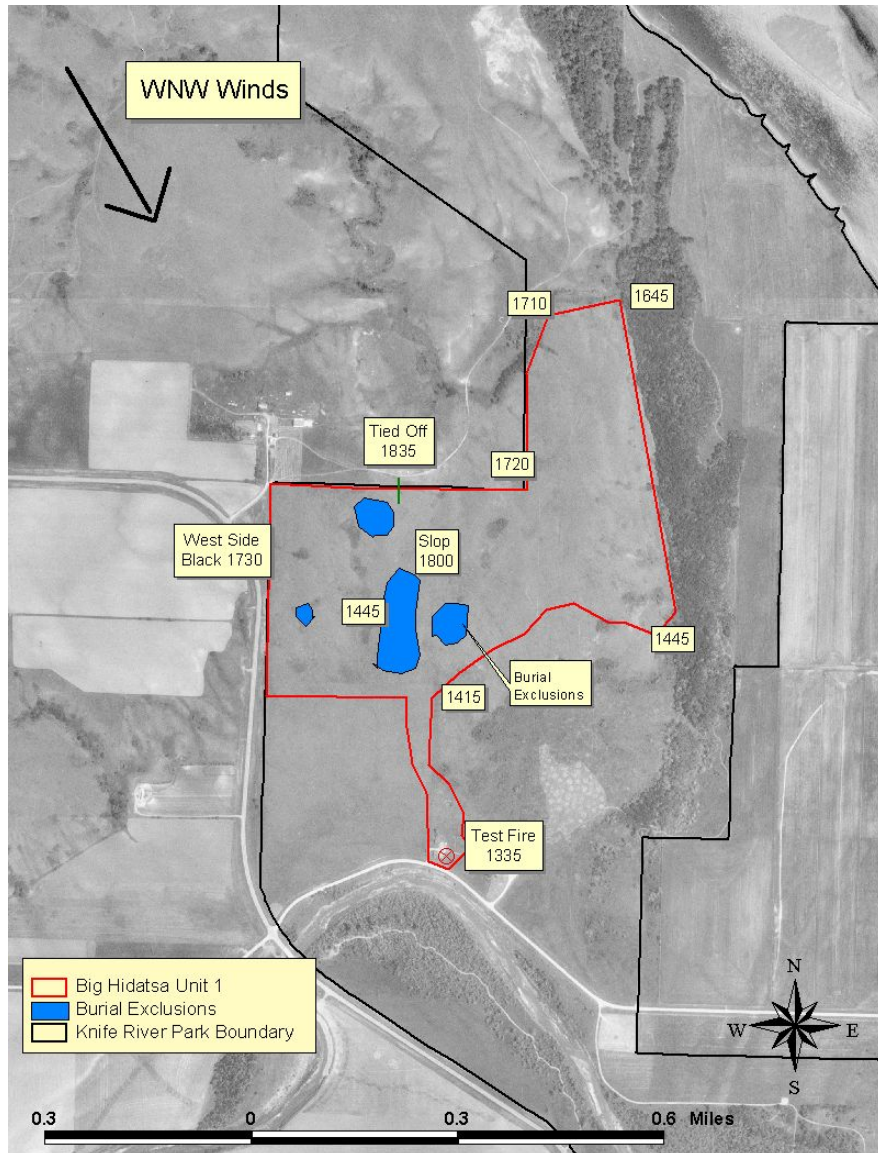
Biomass and Soil Moisture Sampling

| Type | Sample size | Fuel Loading | Average Fuel Loading | Soil Moisture | Average Soil Moisture |
|-----------------|-------------|----------------|----------------------|---------------|-----------------------|
| Needle & thread | 3 | 1.52 tons/acre | 1.4 tons/acre | 6.53% | 10.6% |
| Needle & thread | 3 | 0.94 tons/acre | | 10.72% | |
| Needle & thread | 3 | 1.75 tons/acre | | 11.75% | |
| Needle & thread | 3 | 1.25 tons/acre | | 13.52% | |

Note: 3 soil and 3 biomass samples were obtained near each of 4 FMH plots.

Fire Progression

4/28/05: The test fire for Subunit 1 was started at 1335. From the southeast corner of southern finger (see map below), ignition team 1 proceeded north and ignition team 2 proceeded west. By approximately 1415, ignition teams had burned out the southern finger of the unit. Ignition teams continued firing east and west around the unit. At 1645, ignition team 1 reached the NE corner. By 1730, ignition team 2 had secured the unit on the west side of the burial exclusions. Ignition operations were halted briefly (1800-1815) to allow personnel to contain a minor sloop over at the north end of the largest exclusion area. At 1835, the perimeter of Subunit 1 was secured near the midpoint of the north line. No interior ignition was needed to hasten burn-out.



SUBUNIT 2

Weather Observations

| 4/29 Time | Temperature | | Dew Point | Wind | | | Comments |
|--------------|-------------|-----|--------------|------|----------|-----------|------------------------|
| | Dry | Wet | | RH | Speed | Direction | |
| 0800 | 35° | 31° | 24° | 64 | 7, g 12 | W | Obs for spot forecast |
| 0900 | 35° | 31° | 24° | 64 | 14, g 19 | NW | Snow flurries observed |
| 1000 | 41° | 34° | 22° | 47 | 2-3, g 6 | NNW | Test fire; 90% clouds |
| 1100 | 38° | 32° | 21° | 51 | 5, g 17 | NW | Center of unit |
| 1200 | 39° | 33° | 23° | 52 | 10, g 16 | NW | East line; flurries |

Fire Behavior Observations

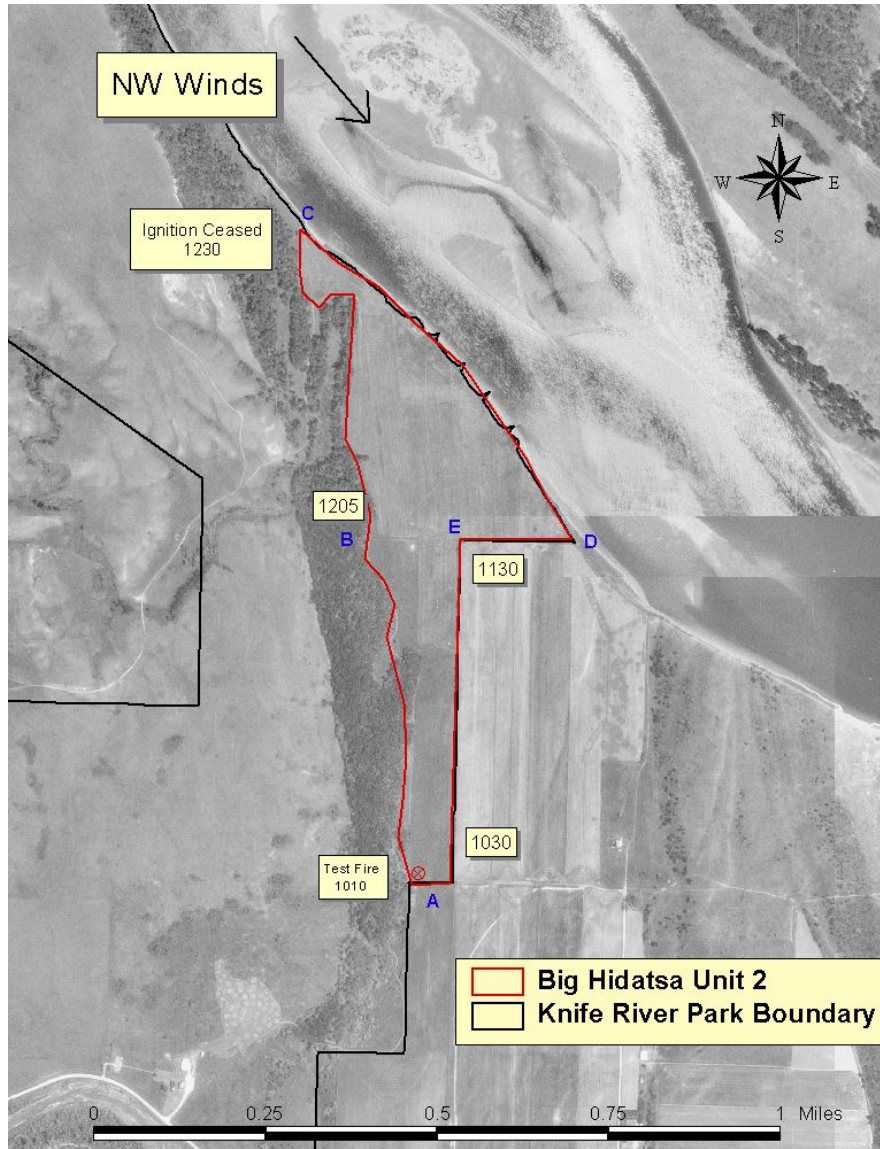
Fire behavior observations were recorded periodically as fire progressed through Big Hidatsa Subunit 2. Rate of spread (ROS) and flame lengths (FL) were documented at numerous random locations. Observations were made in native and non-native, mixed grass fuels (fuel model 1) as well as green ash/box elder woodland fuels (fuel model 2).

| 4/29 Time | Location | Fire Type | ROS | FL | Comments |
|--------------|------------------|--------------|-----|----------|-----------------------------------|
| 1020 | South; test fire | B | 1.5 | 0.5-1.5' | Green ash/box elder; fuel model 2 |
| 1040 | South line | B | 3 | 10"-3' | Smooth brome dominated |
| 1110 | East corner | F | 2 | 10"-2' | Smooth brome dominated |
| 1208 | West line | H | 60 | 3-5' | Big bluestem/smooth brome mix |

ROS= chains per hour (c/h)

Fire Progression

4/29/05: The test fire for Subunit 2 was started at 1010. From the southwest corner, ignitions teams proceeded north. By approximately 1130, the unit was secured to points E and D by the backfire team (see map below). To hasten burn out of the eastern segment of the unit, ignition personnel completed two head fire strips from point E north to the river. Once completed, perimeter ignitions continued along the west line. The unit was secured at the northern tip of the unit at 1230.



Fire Monitoring: Subunits 1 and 2

Four long-term monitoring plots (FMH) are located within Big Hidatsa FY05 Subunit 1. All four needle-and-thread monitoring plots burned 4/28. Post-burn severity assessments showed: 78% of the vegetation as heavily burned, 18% as moderately burned, and 4% as lightly burned. Substrate severity measurements showed: 21% as lightly burned, 50% as scorched, and 29% as unburned. These plots will be read 1, 2, 5, and 10 years post-burn to facilitate the documentation of vegetation change. There are no long-term monitoring plots in Subunit 2.

Smoke Monitoring: Subunits 1 and 2

Because of prevailing northwest winds during both operational periods, holding resources along the southern and eastern perimeters of the burn units were impacted by smoke. On 4/28, smoke was rapidly dispersed by strong winds and, as a result, only slightly impacted county road 18. On 4/29, similar wind conditions minimized smoke impacts to fire personnel on Subunit 2. However, as mentioned above, prescribed fire activities were postponed on Subunit 3 due to potential cumulative smoke impacts to private landowners. The National Weather Service predicted very good smoke dispersal for both days with mixing heights at 5100 and 5200 feet above ground level. Once the fire backed off the fireline, visibility increased dramatically and smoke impact along the fireline decreased. During both days, smoke column development was observed only as ignition teams reached the upwind side of the units.

Conclusions

Approximately 216 acres (of 236) were treated at Big Hidatsa FY05. Nearly 100% of the treatment area was burned. Vegetation monitoring will be conducted at four FMH plots to determine whether or not project-specific objectives were achieved.

