

Date of Report: August 26, 2008

BURNED-AREA REPORT
(Reference FSH 2509.13)

Brown Fire

Little Missouri National Grassland
Dakota Prairie Grasslands
prepared by Mark A. Gonzalez



Figure 1. Brown Fire burned 2410 acres of rangeland and woodlands in the Little Missouri National Grassland, Slope County, North Dakota (view NNE toward Bullion Butte on horizon).

PART I - TYPE OF REQUEST

A. Type of Report

- ☒ 1. Funding request for estimated emergency stabilization funds
- ☐ 2. Accomplishment Report
- ☐ 3. No Treatment Recommendation

B. Type of Action

- ☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
- ☐ 2. Interim Report # ____:
 - ☐ Updating the initial funding request based on more accurate site data or design analysis
 - ☐ Status of accomplishments to date
- ☐ 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

- A. Fire Name:** Brown Fire
- B. Fire Number:** ND-DPF-080711
- C. State:** North Dakota
- D. County:** Slope
- E. Region:** 01 (Northern Region)
- F. Forest:** Dakota Prairie Grasslands
- G. District:** Medora Ranger District
- H. Fire Incident Job Code:** P1EC81
- I. Date Fire Started:** July 23, 2008
- J. Date Fire Contained:** July 27, 2008
- K. Suppression Cost:** \$100,000 to \$150,000 (estimated to date; suppression rehabilitation costs not yet determined)
- L. Fire Suppression Damages Repaired with Suppression Funds**
1. **Fireline waterbarred (miles):** 1 (estimated, proposed)
 2. **Fireline seeded (miles):** 0
 3. **Other (identify):** Dozer line regraded to replace topsoil (4.0 miles; estimated, proposed)
- M. Watershed Number:** Deer Creek: 101102030305
- N. Total Acres Burned:**
- [2060] NFS Acres [] Other Federal [] State [350] Private**
- O. Vegetation Types:** Native mixed-grass prairie (approximately 80%); green ash/chokecherry/buffaloberry shrubs and woody draws (approximately 5%); shrub and desert shrub community across 15% of area.
- P. Dominant Soils:** Fine-textured soils derived from the weathering of weakly lithified terrestrial sedimentary rocks of Tertiary age (Table 1). These soils commonly have low infiltration rates, high runoff rates, steep slopes, and high susceptibility to sheet and rill erosion (Table 2).

Table 1. Soils of the Brown Fire area, Slope County, North Dakota.

Map Unit Symbol	Map Unit Name	Acres
AbC	ABSHER Loam, 3 to 9 percent slopes	219
BaF	BADLAND-CABBART Complex, 9 to 50 percent slope	39
Bb	BADLAND	21
BkC	BENZ Silt Loam, 1 to 9 percent slope	13
BnC	BENZ AND ABSHER Clay Loams, 1 to 9 percent slope	84
BuE	BRANDENBURG-CABBA Complex, 6 to 40 percent slope	97
CfC	CABBART Silt Loam, 3 to 9 percent slope	35
CfD	CABBART Silt Loam, 9 to 15 percent slope	40
CfE	CABBART Silt Loam, 15 to 40 percent slope	449
CgE	CABBART-BADLAND Complex, 9 to 40 percent slope	1024
CtB	CHANTA Loam, 3 to 6 percent slope	6
CyC	CHERRY Silty Clay Loam, 3 to 9 percent slope	11
FkE	FLEAK-BADLAND Complex, 9 to 40 percent slope	14
FIE	FLEAK Soils, 15 to 40 percent slope	86
GIA	GLENDIVE Fine Sandy Loam, 1 to 3 percent slope	23
GIB	GLENDIVE Fine Sandy Loam, 3 to 6 percent slope	6
HaA	HANLY Soils, 1 to 3 percent slope	34

HeA	HAVRE Soils 1 to 3 percent slope	88
KcA	KORCHEA Loam, 1 to 3 percent slope	65
Kh	KORCHEA and HAVRE Soils, channeled	25
MrC	MORTON-RHOADES Silt LoamS, 6 to 9 percent slope	11
PeB	PATENT Loam, 3 to 6 percent slope	7
PsD	PATENT-SHAM-GULLIED land Complex, 3 to 6 percent slope	6

Table 2. Hydrologic and erosion characteristics of soils in the Brown Fire, Slope County, North Dakota.

Map Unit	Acres	Hydrologic Group*	K Factor**	T Factor^	WEG#	WEI###	Slope (%), representative
AbC	219	D	0.32	2	6	48	7
BaF	39	D	0.43	1	4	86	80
Bb	21	D	0.43	1	4	86	80
BkC	13	D	0.43	5	4	86	6
BnC	84	D	0.32	5	4	86	6
BuE	97	A	0.24	2	5	48	23
CfC	35	D	0.37	2	4	86	6
CfD	40	D	0.37	2	4	86	12
CfE	449	D	0.37	2	4	86	40
CgE	1024	D	0.37	2	4	86	20
CtB	6	B	0.28	4	6	48	4
CyC	11	B	0.32	5	4	86	6
FkE	14	D	0.17	2	2	134	33
FIE	86	D	0.17	2	2	134	33
GIA	23	B	0.20	5	3	86	2
GIB	6	B	0.20	5	3	86	4
HaA	34	A	0.17	5	2	134	1
HeA	88	B	0.37	5	4	86	1
KcA	65	B	0.28	5	4	86	1
Kh	25	B		5	4	86	9
MrC	11	B	0.28	3	6	48	8
PeB	7	B	0.32	5	4	86	4
PsD	6	B	0.32	5	4	86	9

***Hydrologic Groups** are based on estimates of runoff potential with Group A having low runoff potential; Group B having moderate rates; Group C having moderately high rates; and Group D having high runoff potential.

****Erosion factor K** indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69 in which higher values indicate greater susceptibility to sheet and rill erosion.

^The **T factor** is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

#A **wind erodibility group** consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

###The **wind erodibility index** is a numerical value indicating the susceptibility of soils to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion.

Q. Geologic Types: Weakly lithified and Intercalated sandstone, mudstone, siltstone, lignite, clinker, bentonite, and shale of the Paleocene Epoch.

R. Miles of Stream Channels by Order or Class: 9.3 miles of ephemeral and intermittent streams

S. Transportation System

Trails: 0 miles **Roads:** 0 miles

(All roads are classified as two-track, earthen trails.)

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 2300 (**low**) 140 (**moderate**) 0 (**high**)

B. Water-Repellent Soil (acres): 0

C. Soil Erosion Hazard Rating (acres): 185 acres (7.7%) (**low**); 2148 acres (89.3%) (**moderate**); 72 acres (3%) (**high**)

Note: Based on whole soil K Factor and Hydrologic Groups

D. Erosion Potential: 15 to 250 tons/acre (from NRCS soil properties)

From ERMiT (Robichaud et al., 2006) (6 to 13 **tons/acre**): Conditions: clay loam soil texture; pre-fire community 15% shrub, 75% grass, 10% bare

Year (Post-Fire)	1st	2nd	3rd	4th	5th
Untreated	13.23	12.96	6.85	6.39	6.06
Seeding	13.23	6.85	6.39	6.06	6.06
Mulch (0.5 ton/ac)	6.5	6.53	6.85	6.39	6.06
Mulch (1 ton/ac)	6.12	6.28	6.85	6.39	6.06
Mulch (1.5 ton/ac)	6.1	6.13	6.85	6.39	6.06
Mulch (2 ton/ac)	6.08	6.07	6.85	6.39	6.06

From ERMiT (Robichaud et al., 2006) **25 to 164 tons/acre**: Conditions: clay loam soil texture; low severity rangeland fire; 5% residual cover. 25 tons/acre average to 164 tons/acre for 50-year return-interval event

E. Sediment Potential: 3400-64,000 cubic yards / square mile

From ERMiT (Robichaud et al., 2006) **25 to 164 tons/ac** (same conditions as above).

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 1-3 under average climatic conditions

B. Design Chance of Success, (percent): 90 (contingent on storm intensity)

C. Equivalent Design Recurrence Interval, (years): Not applicable

D. Design Storm Duration, (hours): Time to concentration is 30 to 60 minutes; design storm is 1 hour.

- E. Design Storm Magnitude, (inches):** 3.42" (10-yr; 30-minute peak rainfall intensity)
- F. Design Flow, (cubic feet / second/ square mile):** Not applicable (channel, not upland treatment)
- G. Estimated Reduction in Infiltration, (percent):** Not applicable (channel, not upland treatment)
- H. Adjusted Design Flow, (cfs per square mile):** Not applicable (channel, not upland treatment)

Reference

Robichaud, P.R., Elliot, W.J., Pierson, F.B., Hall, D.E., and Moffet, C.A., 2006. Erosion Risk Management Tool (ERMiT) Ver. 2006.06.20. [Online at <<http://forest.moscowfs1.wsu.edu/fswepp/>>.] Moscow, ID: USDA Forest Service, Rocky Mountain Research Station.

North Dakota Department of Transportation, 2004. Erosion and Sediment Control Handbook (June 2004), Bismarck, North Dakota, 67 p.

PART V - SUMMARY OF ANALYSIS

- A. Describe Critical Values/Resources and Threats (narrative):** Productive rangeland soils
- B. Emergency Treatment Objectives (narrative):** Prevent interception and concentration of overland flow in cattle trails and low-order drainageways
- C. Probability of Completing Treatment Prior to Damaging Storm or Event:**

Land N.A.% **Channel** 90% **Roads/Trails** 90% **Protection/Safety** N.A. %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	0.95	>0.95	>0.95
Channel*	0.90	0.90	0.90
Roads/Trails*	0.90	0.90	0.90
Protection/Safety	XXX	XXX	XXX

*Success is weather dependent; any event greater than 10-year recurrence interval likely to cause gulying despite treatments.

- E. Cost of No-Action (Including Loss):** Persistence of gullies in drainages and hillslopes for decades; permanent loss of rangeland productivity (\$20/acre/yr X 100 treated acres/yr = \$2000/yr).
- F. Cost of Selected Alternative (Including Loss):** <\$18,000

G. Skills Represented on Burned-Area Survey Team:

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input checked="" type="checkbox"/> Geology	<input checked="" type="checkbox"/> Range
<input type="checkbox"/> Forestry	<input type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input checked="" type="checkbox"/> Engineering
<input type="checkbox"/> Contracting	<input checked="" type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Botany	<input checked="" type="checkbox"/> Archaeology
<input type="checkbox"/> Fisheries	<input type="checkbox"/> Research	<input type="checkbox"/> Landscape Arch	<input checked="" type="checkbox"/> GIS

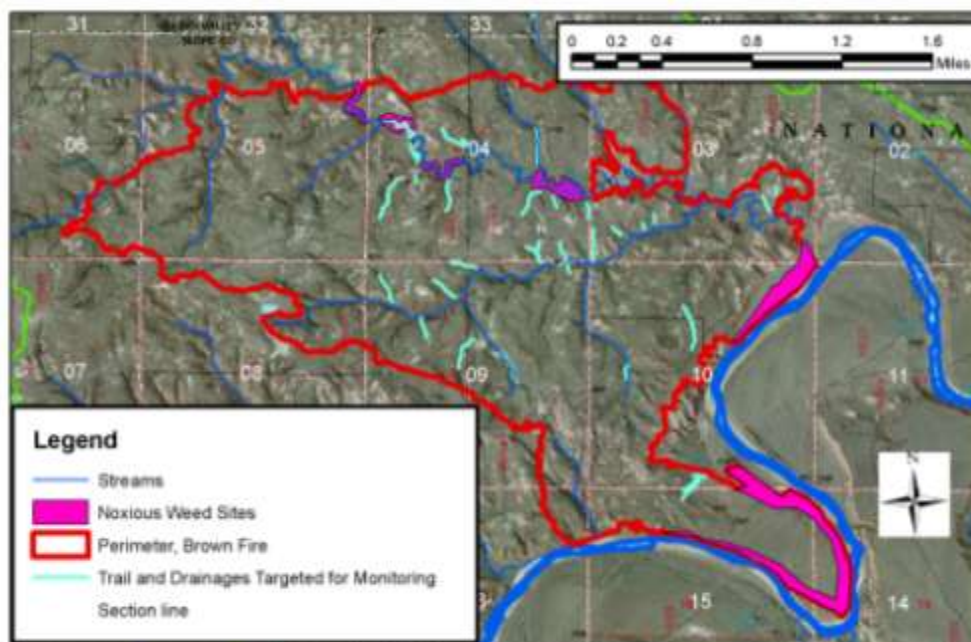
Team Leader: Mark A. Gonzalez

Email: markgonzalez@fs.fed.us **Phone:** 701-250-4443 **FAX:** 701-250-4454

H. Treatment Narrative:

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities. For seeding treatments, include species, application rates and species selection rationale.)

Land Treatments: Funds are requested to monitor and treat for noxious weeds (specifically Canada thistle and leafy spurge) during the spring, summer, and fall of 2009. Noxious weeds have been mapped, treated, and monitored along Deer Creek in Sections 3 and 4 T 135 N/R 105 W from 1998-2002 and 2007 (Figure 2). The spread of noxious weeds is highly likely given (1) the amount of bare ground; (2) the coincidence of moderate-severity burning, which likely will retard recovery of native vegetation, in areas with previous infestations of noxious weeds; and (3) the anticipated high discharge events that could broadcast seeds of noxious weeds along drainageways and channels. The burned floodplain of the Little Missouri River (specifically in sections 10, 14, and 15, T 136N/R 105W) is highly vulnerable to new weed infestations as upstream reaches are heavily infested with leafy spurge.



*Figure 2.
Areas with
known,
treated, or
suspected
occurrences of
noxious weeds
within the
perimeter of
the Brown
Fire.*

**Channel
Treatments:**

Nine drainageways have been identified for erosion-control treatments. Cumulatively, these nine drainageways are 4400 feet in length (see Fig. 3). Assuming an average gradient of 5%, weed-free straw wattles should be placed every 40 feet (ND Department of Transportation, 2004). This equates to approximately 110, 20-ft long wattles. These drainageways are deemed most sensitive to

erosion given the combination of (1) preponderance of high runoff soils (i.e., hydrologic group D soils) in upper watershed; (2) proximity to water sources, making them historic cattle trailing locations; (3) proximity to known noxious weed locations, making spread of weeds more likely.

Roads and Trail Treatments: Five cattle trails have been identified for erosion-control treatments. Cumulatively, these trails are 1800 feet in length (see Fig. 3). These trails are deemed most sensitive to erosion given the combination of (1) preponderance of high runoff soils (i.e., hydrologic group D soils) in upper watershed; and (2) proximity to water sources, making them continued paths of livestock use. Assuming an average gradient of 5%, weed-free straw bales should be placed every 40 feet (North Dakota Department of Transportation, 2004) to dam water in the trail and induce deposition. In addition, staked bales and wattles should detract cattle from using these areas for several years, at which time the vegetation should have recovered and the volume of overland flow should return to pre-fire levels.

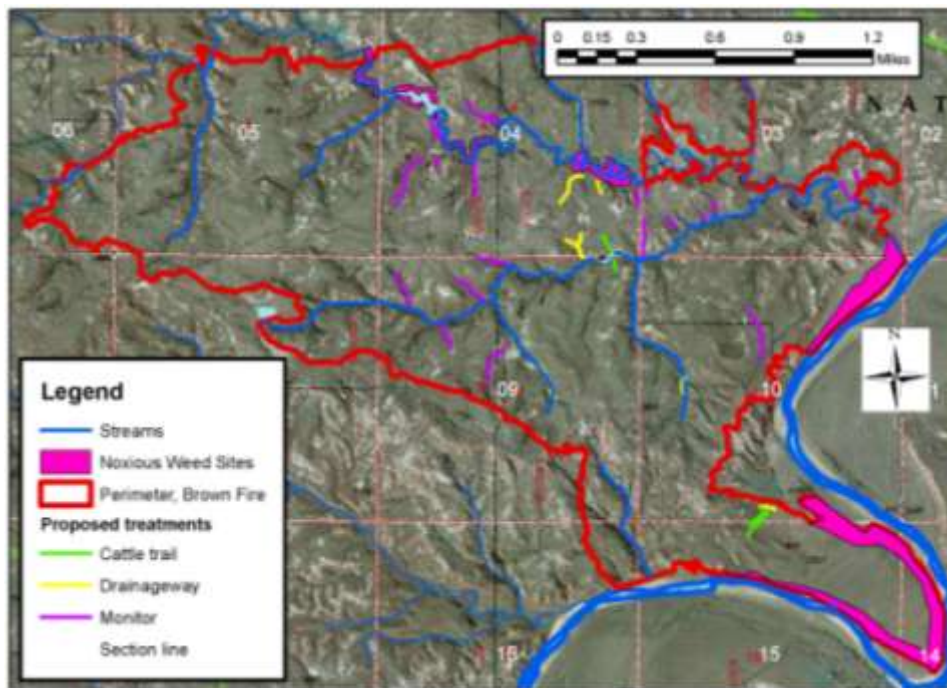


Figure 3. Five cattle trails and nine drainage segments have been targeted for priority erosion-control treatment. These segments occur near cattle watering sources, known weed locations, and/or near high runoff soils where erosion rates and gully potential are greatest.

Protection/Safety Treatments: None

I. Monitoring Narrative:

(Describe the monitoring needs, what treatments will be monitored, how they will be monitored, and when monitoring will occur. A detailed monitoring plan must be submitted as a separate document to the Regional BAER coordinator.)

Noxious weeds.

A range specialist will inspect the Deer Creek and Little Missouri River valleys by foot and/or ATV or UTV (all-terrain or utility vehicle) for the emergence of noxious weeds on a monthly cycle during the 6-month growing season (May – October) in 2009. Treatment of noxious weeds with herbicide will be conducted promptly to prevent the production of seeds and to permit the establishment of native vegetation.

Monitoring of cattle trails and drainageways.

Treated trails and drainageways will be examined monthly to determine if structures are properly functioning. Repeat photography will be taken at the end of year 1 and subsequent years until vegetation cover has returned to near pre-fire levels. When wattles have filled half-way with sediment, the sediment will be removed to restore runoff-trapping volume of structures. Untreated trails and drainageways will be inspected to see if they are resilient enough to handle runoff events without gullyng.

Monitoring of Riparian Areas.

The major riparian area (Deer Creek) retained adequate moisture during summer of 2008. Consequently, riparian vegetation along Deer Creek survived fire in fine shape (Fig. 4). Sediment trapping capacity of Deer Creek remains high as does its resistance to gullyng and channel erosion. Riparian area will be inspected every month during noxious weed monitoring visits to determine if Deer Creek is still functioning properly. If excessive sedimentation and/or channel erosion is compromising ecological functionality of Deer Creek, follow up treatments may be requested.



Fig. 4. Riparian vegetation along Deer Creek had high plant-moisture levels and survived Brown Fire in fine shape. Riparian vegetation should trap sediment and prevent channel erosion.

Part VI – Emergency Stabilization Treatments and Source of Funds**Interim #**

Salary/perdiem: installation	person	300	12	\$3,600	\$0		\$0	\$0	\$3,600
Delivery/Mobilization	ea.	750	1	\$750	\$0		\$0	\$0	\$750
Salary+perdiem: maintenance	person	300	4	\$1,200					
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Channel Treat.</i>				\$5,600	\$0		\$0	\$0	\$4,400
C. Road and Trails									
2"X2"X6' stakes	gross	50	1	\$50					
Bales/wattles*, weed-free	lin ft	2.00	100	\$200	\$0		\$0	\$0	\$200
Salary + perdiem: installation	person	300	12	\$3,600	\$0		\$0	\$0	\$3,600
Delivery mobilization	ea.	500	1	\$500	\$0		\$0	\$0	\$500
Salary+perdiem: maintenance	person	300	4	\$1,200					
Salary+perdiem: supervision	person	500	2	\$1,000					
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Road & Trails</i>				\$6,500	\$0		\$0	\$0	\$4,300
D. Protection/Safety									
				\$0	\$0		\$0	\$0	\$0
				\$0	\$0		\$0	\$0	\$0
				\$0	\$0		\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Structures</i>				\$0	\$0		\$0	\$0	\$0
E. BAER Evaluation									
	Day	3		---1500			\$0	\$0	\$0
<i>Insert new items above this line!</i>				---	\$0		\$0	\$0	\$0
<i>Subtotal Evaluation</i>				\$1,500	\$0		\$0	\$0	\$0
F. Monitoring									
Salary (weeds)	person	\$250	6	\$1,500	\$0		\$0	\$0	\$1,500
Salary (channel/trails)	person	\$400	2	\$800					
<i>Insert new items above this line!</i>				\$0	\$0		\$0	\$0	\$0
<i>Subtotal Monitoring</i>				\$2,300	\$0		\$0	\$0	\$1,500
G. Totals									
Previously approved				\$19,160					
Total for this request									

*Free delivery to distributor with minimum order of 3000 linear feet

PART VII - APPROVALS

1. _____
Grasslands Supervisor (signature) _____
Date

2. _____
Regional Forester (signature) _____
Date