USDA-FOREST SERVICE FS-2500-8 (7/00)

Date of Report: 7/9/2004

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[ ] 1. Funding request for estimated WFSU-SULT funds
[X] 2. Accomplishment Report
[] 3. No Treatment Recommendation

B. Type of Action

[ ] 1. Initial Request (Best estimate of funds needed to complete eligible rehabilitation measures)

[ ] 2. Interim Report
[ ] Updating the initial funding request based on more accurate site data or design analysis
[ ] Status of accomplishments to date

[X] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Mormon

B. Fire Number: AZ-COF-034

C. State: AZ

D. County: Coconino

E. Region: 3

F. Forest: Coconino

G. District: Mormon Lake

H. Date Fire Started: June 6, 2003

I. Date Fire Contained: Estimated July 7, 2003

J. Suppression Cost: $10,000 estimated by containment 7/7/2003.

K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 0
2. Fireline seeded (miles): 0
3. Other (identify): 0

L. Watershed Number: 15020015030

M. Total Acres Burned:
NFS Acres(**2719**) Other Federal ( ) State ( ) Private ( )

N. Vegetation Types: Pinyon Pine/Juniper/Gambel Oak (on Haplustalfs), and Pinyon Pine/One seed Juniper/Cliffrose/ sparse Blue grama, side oats grama and needle and thread grass (on Ustochrepts),

O. Dominant Soils: Typic and Lithic Haplustalfs, loamy-skeletal, mixed mesic, and Lithic Ustochrepts, loamy-skeletal, carbonatic, mesic

P. Geologic Types: Kaibab limestone

Q. Miles of Stream Channels by Order or Class: 2.25 miles (1st Order), 1.9 miles (2nd Order)

R. Transportation System

Trails: 0 miles Roads: 2.35 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 1175 (Unburned and High) Trace (moderate) 1544 (High)

B. Water-Repellent Soil (acres) 1100

C. Soil Erosion Hazard Rating (acres):
599 (low) 2040 (moderate) 80 (high)

D. Erosion Potential: 7 tons/acre (USLE)

E. Sediment Potential: NA tons/acre

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 2

B. Design Chance of Success, (percent): 75

C. Equivalent Design Recurrence Interval, (years): 50

D. Design Storm Duration, (hours): 6

E. Design Storm Magnitude, (inches): 2.6

F. Design Flow, (cubic feet / second/linear streamcourse: 6908 cfs (TR55 model, portion of 6th code)

G. Estimated Reduction in Infiltration, (percent): 37 % (based on hydrophobicity)

H. Adjusted Design Flow, (cfs per linear streamcourse): 9464 cfs (adjusted TR55)

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency: Post-fire digital aerial photographs, aerial mapping, and feel survey were used to map burn severity classes.

An interdisciplinary BAER team validated and evaluated on-site burn severity delineations. 43 percent of the burn perimeter (1175 acres) falls into the unburned and high burn severity class.and 57 percent (1544 acres) is high.

Analysis across the 6th code watershed identifies about 3% in the unburned and high dual burn severity class and about 3% falls within the high class. Burned area classes within the Mormon fire account for approximately 6% of the 6th code watershed.

The fire burned in a mosaic of high and unburned burn severity classes. Two classes were selected (High, and Unburned and High) based on their dominance. In general, the herbaceous layer was very low or sparse in species composition and productivity and only burned in high areas. Because the understory is sparse to low in species composition, little seed bank and regeneration potential exists. For this reason, emergency conditions exists to short-term and long-term site productivity and seeding treatments are proposed to prevent invasion and expansion of noxious weeds by providing and encouraging select competitive grasses in their place.

The litter layer and tree canopy were completely consumed in high areas. The unburned and high class was predominantly a crown and litter fire and only burned in the high areas. The ground vegetation did not carry a ground fire in unburned areas.

The unburned and high class has an average aerial extent of about 65 percent unburned and 35 percent burned. The BAER team recommends seeding only the high burn severity acres adjacent to high infestations of invasive weeds with ground seeding due to the complexity of the burned pattern. Acreage in these areas is about 200 acres.

The high class has about 65 percent high burned and about 35 percent unburned. The majority of high burn severity classes are located on gentle slopes. Total acres burned in the high class are 1544 acres. The BAER team recommends only aerial seeding the high areas which equates to about 65 percent of the 1544 acres or 1000 acres. Based on USLE erosion model estimates, these areas along with other burn severity areas should result in low to moderate amount of sheet and rill erosion. The majority are within tolerable soil loss thresholds.

Two order 2, ephemeral streams and two, order 1, epemeral streams are located along and within the burn perimeter Some short-term deposition can be expected following initial monsoon stormsbefore high burned areas revegetate.

Currently, there are large poplulations of invasive weeds (both cheatgrass brome and scotch thistle) directly adjacent to the fire. Historically, these areas were converted (pushed) and have since been invaded by invasive weeds. Futhermore, the 1977 Yellowjacket Fire, located south of the fire, never regenerated into acceptable native herbaceous vegetation due to low seedbank of native grasses and could be an additional source of invasive weed invasion. . It is believed that if the Mormon Fire remains untreated, it will have unacceptable regeneration and site degradation similiar to the Yellowjacket Fire due to overall low seedbank and invasion of noxious weeds.

Scotch thistle is present along numerous raodsides and also poses a threat to natural regeneration of areas in high burn severity classes. The greatest risk of invasive species expansion is probably directly adjacent to converted areas, and roads.

Based on the results of the BAER assessment, the Mormon Fire poses an emergency threat to site productivity and if untreated, would likely result in unacceptable resource degradation due to the invasion, establishment and expansion of invasive weeds.

There are numerous partially burned trees hanging across a few roads within the burn. These trees are likely to fall across the road Several fallen trees are currently located across the road also. **These hazardous trees pose a safety threat to travellers by forcing them to drive over trees or outside of the road prism in precarious areas unsafe for passage.**

B. Emergency Treatment Objectives:

1) To prevent the unacceptable degradation of the vegetative and soil resource due to the invasion, establishment, and expansion of invasive weeds into burned areas. Anticipated desired vegetation cover is inadequate due to pre-fire extremely low herbaceous understory and dominance of invasive weeds in and adjacent to burned areas. Accelerated soil erosion will be

minimized with establishment of more effective vegetative ground cover (perennial basal area and litter).

2) To establish and maintain healthy, weed-resistant plant communities (few resources are available, e. g. soil nutrients and water, to potential invaders.
3) To Mitigate the reestablishment of invasive plants in burned areas.
4) To remove the safety hazard associated with hazardous trees adjacent to roads.

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm: na

Land **75** % Channel ___ % Roads **100** % Other ___ %

D. Probability of Treatment Success 75

	Years after Treatment		
	1	3	5
Land	75	85	90
Channel			
Roads	100	100	100
Other			

E. Cost of No-Action (Including Loss): $198,750.

F. Cost of Selected Alternative (Including Loss): **$109, 417 ($67,690) for treatment only)**

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology [x] Soils [ ] Geology [X] Range [ ]
[ ] Forestry [**X**] Wildlife [ ] Fire Mgmt. [X] Engineering [ ]
[ ] Contracting [x] Ecology [**x**] Botany [X] Archaeology [ ]
[ ] Fisheries [ ] Research [ ] Landscape Arch [ ] GIS

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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 Treatment Objectives:

1) To prevent the unacceptable degradation of the vegetative and soil resource due to the invasion, establishment, and expansion of invasive weeds into burned areas. Anticipated desired vegetation cover is inadequate due to pre-fire extremely low herbaceous understory and dominance of invasive weeds in and adjacent to burned areas. Accelerated soil erosion will be minimized with establishment of more effective vegetative ground cover (perennial basal area and litter).

2) To establish and maintain healthy, weed-resistant plant communities (few resources are available, e. g. soil nutrients and water, to potential invaders.
3) To Mitigate the reestablishment of invasive plants in burned areas.

We are proposing two types of treatment to achieve these three objectives. Treatments will occur immediately and preferably before July 2003 monsoons begin. It is imperative to seed before monsoons begin to take advantage of existing ash layer with high nitrogen availability and to seed before soil crusting may occur. Experience shows that invasive weeds including cheatgrass do regrow 2 to 3 times during the growing season and will likely invade burned areas if left untreated.

The first type of treatment is a preventative seeding focusing on buffer strips near the heaviest sources of cheatgrass, generally near old type conversions, connecting roads and on the south side of the fires near the Yellowjacket Fire. Certified, weed-free seed will be used. Ground seeding with ATV's will focus on high burn severity areas within the unburned and burned class totalling 200 acres. A higher seeding application rate (13 lbs/acre) will be used in these areas. We will use higher seeding rates in buffer strips on the perimeters of the burned area near potential invaders to allow the natives more time to establish a healthy community. Species were selected from known local surveys based on their ability to compete with invasive weeds. These species were further refined thru conversations with experts at NAU, RMRS, and Reggie Fletcher. If weather conditions are not favorable this August/September re-seeding may be necessary. It is possible reseeding may occur in FY 04.

A lower seeding application rate (8.2 lbs/acre) will be used on the interior of the burned area and in identified high burn severity classes. Aerial seeding will accomplish the seeding on about 1000 acres. Because the high class includes about 35 percent unburned areas in the mosaic, it will be necessary for seeding to target the high burned areas only. These areas are currently clearly visible.. See Tables below.

The second type of treatment involves eradicating all Scotch thistle populations on the perimeter of the burn site. Two to three treatments of this 15 acre area will be needed to prevent seed set and weed expansion over the next calendar year. These populations are patchy and will require individual spot treatment. The current local rate for herbicide/mechanical treatment of this type is ~$180/acre, this includes cutting and bagging all mature plants to prevent establishment of a seed bank in the first year, and herbicide application to rosettes. The second round treatment, the following spring, would be only herbicide at ~$110/acre.

Proposed Seed Mix

COMMON NAME	SCIENTIFIC NAME (Genus – Species; Vatiety)	Pounds Pure Live Seed /Species /Acre	seeds per pound	seeds per acre	% By Weight	Percent By Seed	Estimated Cost Pure Live Seed Pound	Estimated Cost Of Mix Per Acre
Needle and Thread	Stipa comata	0	115,000	0	0.00%	0.00%	$40.00	$0.00
Blue Grama	Bouteloua gracilis; Hatchita	0.5	825,000	412500	3.85%	12.28%	$12.00	$6.00
Side Oats Grama	Boutelous curtipendula,	2	191,000	382000	15.38%	11.37%	$6.00	$12.00
Indian rice grass	Achnathrum hymenoides	2.3	141,000	324300	17.69%	9.65%	$5.00	$11.50
Sand dropseed	Sporobolus cryptandrus	0.3	5,298,000	1589400	2.31%	47.31%	$7.00	$2.10
Galleta grass	Hilaria jamesii; Viva caryopsis?	1.2	470,000	564000	9.23%	16.79%	$10.00	$12.00
Quick Guard	Wheat X Rye (sterile hybrid)	6.7	13,000	87100	51.54%	2.59%	$2.00	$13.40
	TOTALS	13		3359300	100.00%	100.00%	$4.38	$57.00

Cost by Application Rate

FIRE	BURN Intensity	ACRES Burned	ACRES Seeded	COST per acre	TOTAL COST
MORMON	HIGH (Interior burn:8.2lbs/acre)	1544	1000	39.6	$ 39,600.00
MORMON	Unburned/ High (treat buffers: 13lbs/acre)	1175	200	62.7	$ 12,540.00
	TOTALS	**2719**	**1200**	**$ 43.45**	**$ 52,140.00**

Estimated total cost for pure, live seed for 1120 acres includes an additional 10% for potential calibration error.

Channel Treatments:none

Roads and Trail Treatments: Hazardous trees were identified in the ground survey and to pose a safety threat to travel within the burn perimeter. There are approximately 20 burned trees fallen across a few roads or hanging across the roads and likely to fall. It is estimated hazardous tree removal can be accomplished in 1 day by a 3 person fire crew. Trees will be removed and scattered acorss burned areas seeded.

Structures:none

I. Monitoring Narrative

A detailed monitoring plan will be submitted as a separate document to the Regional BAER coordinator at a later date. Estmated costs is $2500.

The objective of monitoring is to evaluate the effectiveness of the treatments and decide if retreatment is necessary.

Noxious weed management focuses upon density and rate of spread of invasive exotic plant species, and the effect these aggressive plants have on the native vegetative community. As soon as possible and in FY 2003, all invasive species with the potential to invade the burned area should be accurately mapped. A general survey for the presence/absence of the target invasives in the burned area can be done in late fall of 2003(FY 2004) to guage preliminary effectiveness of proposed treatments. Then a more detailed survey recording cover (density) of all species in plots within the different treatment areas will be done the following spring (FY 2004) once the winter annuals are maturing. At the same time, spring return visits to the mapped populations will assess rate of spread over one year.

Post-Treatment Narrative and Results (6/30/2004). (Detailed information can be seen in the attached Monitoring Plan)

1. **Thistle Eradication:** The first stage of this treatment was the prevention of seed set in 2003. We considered this step a success since fall 2003 we did not observe any mature seed heads on Scotch thistle plants in the immediate burn areas.

This second step was to eliminate Scotch thistle rosettes from known sites in 2004. This may have been possible with the use of pre-emergent herbicides, but the NEPA was not in place to allow this treatment alternative. Infested areas were monitored for reduction or elimination. We were able to eliminate (in 2004) all living plants in most Scotch thistle sites. Populations were simply reduced, due to the

inaccessibility and safety hazards of the areas. However, we hope to continue long term monitoring and spot treatments of these sites, since Scotch thistle seeds remain viable in the soil for 6 –12 years.

Healthy native plant communities were observed in most sites in 2004, during and after the manual control. They included native grasses and forbs, and some of the seeded species. There are several other exotics in the area including horehound (*Marrubium vulgare*), tumble weed (*Salsola kali*), cheatgrass (*Bromus tectorum*) and puncture vine (*Tribulus terrestris*). Only cheatgrass would pose a serious threat to the establishment of a healthy grassland in this area.

2. **Seeding to Prevent Cheatgrass Expansion:** Neighboring cheatgrass invasion was not observed into moderate or high burned severity polygons except in very few select areas. As of 6/30/2004 it appears as though cheatgrass has not expanded into burned areas although due to very limited precipitation, it may be too early to draw conclusions. Further monitoring will be performed by Forest Specialists from Forest project funds.

The initial response was limited due to lack of and the timing of precipitation. Annual precipitation data indicated well below normal precipitation and drought conditions continued to persist spanning several years. However, a more accurate determination for the initial response may be made after the monsoon precipitation this coming July and August. This would give the warm season grass seed a full year to respond. Our crew will be collected more data at that time.

Even though, success of the reseeding effort was low, last fall the areas that received precipitation indicated some success. The loss of the A horizon and ash due to high wind erosion before precipitation negatively affected seedling germination because there was little soft, fertile ash seedbed left in many areas. It looked like the moderately burned areas had some success and the highly burned areas had lower success. There was at least one storm event after the fire had occurred and before we seeded. The remaining ash appeared to slightly harden or “cap” the top 2 millimeters which negatively affected the seedbed and its ability to promote germination. It is unfortunate that we could not seed before the first storm event. Delays in contracting probably contributed to low seeding germination success because the seeding occurred after the first beneficial storm.

Even though the soils have been greatly affected, the areas that had a lower burn severity had a better response. The established blue grama (BOGR) responded very well (better than the Lizard Fire) to the fires and precipitation, producing an excellent seed crop which will help with the reestablishment of grasses in the higher severity burned areas. Areas that had dense PJ and are now open to reestablishment of grasses from this seed bank and the reseeding effort.

3. **Hazard Tree Removal:** Approximately 15 burned trees were successfully removed decreasing safety hazards to Forest users on established roads.

Part VI – Emergency Rehabilitation Treatments and Source of Funds by Land Ownership

			NFS Lands				Other Lands			All
		Unit	# of	WFSU	Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	SULT $	$	units	$	Units	$	$
A. Land Treatments										
Aerial seed	acres	35	1000	$35,000	$0		$0		$0	$35,000
Aerial application	acres	10	1000	$10,000	$0		$0		$0	$10,000
Ground seed	acres	60	200	$12,000	$0		$0		$0	$12,000
Ground application	acres	27	200	$5,400	$0		$0		$0	$5,400
1st thistle eradication	acres	265	15	$3,975	$0		$0		$0	$3,975
2nd thistle eradication	acres	310	15	$4,650	$0		$0		$0	$4,650
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$71,025	$0		$0		$0	$71,025
B. Channel Treatments										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails										
Hazard tree removal	each	20	14	$280	$0		$0		$0	$280
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$280	$0		$0		$0	$280
D. Structures										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Structures				$0	$0		$0		$0	$0
E. BAER Evaluation										
Assessment	p.days	240	10	$2,400	$0		$0		$0	$2,400
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Evaluation				$2,400	$0		$0		$0	$2,400
F. Monitoring										
	p. days	200	27	$5,400	$0		$0		$0	$5,400
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$5,400	$0		$0		$0	$5,400
G. Totals				**$79,105**	**$0**		**$0**		**$0**	**$79,105**

PART VII - APPROVALS

1. /s/ Nora B. Rasure — August 9, 2004
   Forest Supervisor — Date

2. _____ — _____
   Regional Forester (signature) — Date