USDA-FOREST SERVICE FS-2500-8 (6/06)

Date of Report: 6/28/2006

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[**X**] 1. Funding request for estimated emergency stabilization funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[**X**] 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:Potato Complex

B. Fire Number: AZ-ASF-060252

C. State:AZ

D. County:Navajo

E. Region: 03

F. Forest: Apache-Sitgreaves

G. District: Black Mesa

H. Fire Incident Job Code: P3CN2Y

I. Date Fire Started: 6/6/2006

J. Date Fire Contained: June 23, 2006

K. Suppression Cost: 3.7 million

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 1 Most of the line on <5% slope, slashed if material available
2. Fireline seeded (miles): 46
3. Other (identify):

M. Watershed Number: 1502001001 (Upper Chevelon Canyon) 1502001003 (Lower Chevelon Canyon)

N. Total Acres Burned: 6248
NFS Acres(**X**) Other Federal ( ) State ( ) Private ( )

O. Vegetation Types: Ponderosa Pine, Pinyon Juniper Woodlands

P. Dominant Soils: 51, 52, 187, 186, 41, 183,

Q. Geologic Types: Sedimentary (limestones, sandstones)

R. Miles of Stream Channels by Order or Class: intermittent 3.8 miles, ephemeral 16.0 miles

S. Transportation System

Trails: 0 miles Roads: 10.5 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 1562 (low) 265 (moderate) 3027 (high)

B. Water-Repellent Soil (acres): 2000

C. Soil Erosion Hazard Rating (acres):

3947 (low) 1265 (moderate) 1036 (high)

D. Erosion Potential: 13.7 tons/acre

E. Sediment Potential: 8800 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 25

B. Design Chance of Success, (percent): 80

C. Equivalent Design Recurrence Interval, (years): 25

D. Design Storm Duration, (hours): 1

E. Design Storm Magnitude, (inches): 1.9

F. Design Flow, (cubic feet / second/ square mile): 109 (north end drainages)

G. Estimated Reduction in Infiltration, (percent): 41

H. Adjusted Design Flow, (cfs per square mile): 245 (north end drainages)

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Life and Private Property There is no known threat to life or property.

Soil Loss

There are five groups of soils within the area of the Potato Fire, soils on slight to strongly sloping slopes (1) and moderately steep slopes (2) associated with pinyon-juniper overstory; soils on slight to strongly sloping slopes (3) and moderately steep slopes (4) associated with ponderosa pine overstory; and soils on steep and very steep slopes (5). Soils under pinyon-juniper woodland are shallow to moderately deep, with very gravelly or very cobbly sandy loam surface horizons, and sandy clay loam to clay subsurface horizons occurring from 4

to 6 inches below the surface. The pre-fire condition of the vegetation is characterized as having about 45 percent woodland overstory, with litter below the canopies of the trees, and low density blue grama with little litter between the trees. In areas of moderate and high soil burn severity, the overstory and litter under the tree canopyies were totally consumed. Recent drought conditions have reduced the vigor of remaining plants, leaving less than 10 percent effective ground cover. Hydrophobicity was determined to be moderate to high under the consumed canopies, and low in the intertree spaces where sparce grass previously existed. Test burning in the 1980's on similar vegetation, soils and fire intensities resulted in heavy loss of effective ground cover, soil loss and very slow recovery of vegetation (Tamietti, personal communication). Heavy sedimentation was observed in one stock tank below the test burns.

Groups 3 and 4 consist of soils under ponderosa pine overstory are characterized as being shallow to moderately deep, well drained soils with surface textures of gravelly to very cobbly sandy loams, with clay to very cobbly clay occurring from 4 to 10 inches below the surface. Effective groundcover estimates are from 55 to 75 percent primarily of duff and pine needles. Soil burn severity was generally low (75%) in this group, and soil loss is predicted to return to below tolerance by year 3 with no treatment on these soils. However, seeding of a few large contiguous moderate or high severity areas near would be beneficial in reducing sediment to Daze Canyon.

The fifth group occur on steep slopes, are moderately deep or deep, well drianed, with very cobbly sandy loam or loam surface horizons. Vegetation ranges from pinyon juniper to mixed conifer depending upon aspect, with conifer needles and duff providing most of the effective ground cover. Ground cover in many areas within these units is below the level needed to prevent accelerated erosion, however, most of the area was either unburned or burned at low severity (160 of 200 acres).

Soil loss was estimated by the Erosion Risk Management Tool (Robichaud and others, 2006). Within the model, soil loss estimates are made for no treatment, seeding and mulching at the rate of 1 ton per acre of straw for moderate and high soil burn severity acres. Soil group 1 had the largest amount of high and moderate burn severity (1960 acres), where potential soil loss is estimated to be 2 to 3 times the tolerance level. It is estimated that with no treatment, it will take over 3 years of recovery to return to below tolerance levels as predicted by the model, but could be much longer based on field observations of similar burns. Large contiguous blocks of moderate/severe occur in the northern 2/3s of the fire. The team has already observed some wind erosion in the area, with some small dunes forming. Seeding native species is highly recommended for all high and moderate soil burn severity areas, and mulching of larger blocks of moderate and severe soil burn severity areas would be beneficial. Areas with very cobbly surface rock (>45 percent) should be seeded, but no mulching is recommended. Soil loss is estimated to be 10 to 15 times prefire conditions in soil group 2. Soil loss in these areas will not return to tolerance soil loss conditions for more than 3 years without treatment based on modelling, although we estimate a longer period based on field observations of similar burns on these soil units. The soils of this unit is far more succeptable to water erosion than group 1 and would be the highest priority for straw mulching.

Moderate/High burn severity with PJ

Wind erosion exposing blue grama roots

Water Quantity and Stream Channel Stability

Hydrophobic conditions were encountered in high severity burned areas in both ponderosa pine and pinyon juniper vegetation types. Some low to moderate hydrophobicity was encountered in the high severity burned ponderosa pine at the south end of the burned area. Low levels of pre-fire ground cover in these stands resulted in a mosaic of hydrophobic soils interspersed with soils showing no hydrophobicity. Soils with moderate and low burn severity did not exhibit hydrophobic conditions. The pinyon juniper woodlands in the central and northern portions of the burn, sustained much more intense burns and a correspondingly more severe burn severity. Prior to the fire these stands had sustained a high mortality of pinyon due to bark beetle infestation. The survey team noted a spatial pattern, typical of severe burns in this vegetation type, of highly variable levels of hydrophobicity with moderate to severe hydrophobicity in areas of higher pre-fire organic matter accumulation beneath trees and no to light hydrophobicity in grass dominated openings in the pre-fire tree canopy. Some degree of recovery of grasses (primarily blue grama) is expected in these former openings. However, nearly 100% of pre-fire vegetative ground cover in the moderate to severely burned areas has been lost as well as nearly 100% the tree and shrub canopy. The removal of the canopy and ground cover combined with the hydrophobicity has decreased the infiltration rate of these areas and will lead to highly elevated levels of runoff and consequent highly elevated soil erosion from them.

This fire was wind driven and burned in a long narrow corridor oriented in the predominant wind direction for this area. Most of the burn occurred on flat mesa tops that are now exposed to long, uninterrupted wind fetches. Considerable wind erosion has already taken place in the northern portion of the burn resulting in re-distribution of soils on the mesa tops. Dunes of soil material have formed downwind of any obstructions. Remaining root crowns of live grasses in the less severely burned areas are being undermined and exposed by the wind erosion indicating that already 1 to 3 inches of soil have been eroded in parts of the north end of the burn. Wind erosion will likely be as great a hazard to this area of the burn as water erosion.

Most of the incised drainage bottoms in the southern portion of the fire either remained unburned or were only lightly burned. This includes Wildcat Canyon which crosses the burned area in the central portion of the fire. It sustained only occasional spot fires. Its riparian vegetation remains largely intact. However, drainages in the northern end of the burn, including some direct tributaries of Chevelon Canyon, were stripped of canopy and ground cover and sustained high burn severity over much of their extent. Runoff modeling indicates that these drainages can expect to convey peak flows of magnitudes more than double those which occurred pre-fire. These drainages generally have areas of natural rock control which will limit downcutting that may result from increased runoff rates from the burned area. However, the drainages can be expected to convey increased sediment loads to Wildcat Canyon and eventually to Chevelon Canyon. It is unlikely that Wildcat Canyon itself will sustain damage from increased peak flows since the burned area of the Potato fire amounts to only about 7 percent of its total watershed area.

Water Quality

The principal water quality concerns are increases in sediment and ash into the lower reaches of Wildcat and Chevelon Creeks. The distribution of high burn severities, the high sediment transport capacity of the drainages within the severely burned areas of the fire, and the surface drainage patterns of the burned area will result in a concentration of sediment and ash inputs to Wildcat Canyon at the mouth of Daze Canyon and other tributary drainages in the middle and north end of the fire. These ash and sediment pulses will be considerably reduced in concentration by the time that they would arrive at the confluence with Chevelon Canyon, about 6 miles downstream of the fire. However, pulses of sediment and ash will likely be conveyed directly to Chevelon Canyon by the unnamed ephemeral channel that drains most of the northern area of the fire. Even here there will be some lessening of the pulse concentrations over the approximately 4 miles of channel below the Potato fire that water must travel before draining into Chevelon Canyon. Perennial pools occur in the reaches of West Chevelon Canyon between the mouths of Wildcat Canyon and the above mentioned ephemeral stream as well as below both confluences. Water quality impacts due to sediment and ash may be detrimental to aquatic species which survive in these pools.

Transportation

FR 504, a principal travel route in this portion of the District, crosses the burned area. Three bridge stream crossings occur along this reach of the road – on Wildcat Canyon, Daze Canyon and an unnamed ephemeral tributary of Daze Canyon. All three bridge crossings have ample capacity to accommodate the increased water flows which might result from this fire. However, trees and brush growing in the channel above the Daze Crossing bridge present a hazard by potentially restricting flow through the structure and accumulating woody debris at its upstream end. Much of the Daze Canyon watershed (43%) has been burned, and there is ample debris in or near the channel that could be conveyed to the bridge during peak flows. Also there is a concern that slash placed on rehabed fire line directly upstream of the bridge on the Daze Canyon tributary may be conveyed to the bridge during extreme precipitation events.

Several miles of road in addition to FR504 cross or are adjacent to the burned area. There are no stream crossings on these roads. One road, FR153c was built, for part of its length, in the bottom of the main drainage on the north end of the fire. It is likely that this road section will be impacted during subsequent runoff events from the burned area by heavy sedimentation and/or downcutting. The road is poorly located and should probably be rebuilt on a more appropriate alignment. FR153b crosses this same drainage at a ford approximately 0.6 miles below the burn. This ford may require maintenance due to burn related impacts.

There is one ford crossing of Potato Wash on FR95 downstream of the fire. This ford is not threatened by fire related impacts. There are no road crossings of Wildcat Canyon below the burned area and the nearest road crossing of Chevelon Canyon is approx. 50 miles downstream of the fire.

Noxious Weeds

No occurances of noxious weeds have been reported within the Potato Fire Area (Hughes, personal communication). However, the area has had no formal weed survey. The pinyon-juniper zone occuring on the north 2/3 of the fire is characterized as having dense woodland overstory, with litter occurring below the crowns of the plants. Interplant cover is limited to very low ground cover density of primarily blue grama, with little litter. In areas of high and moderate burn severity, overstory and litter beneath those canopies were completely consumed, leaving less than 10 percent effective ground cover. Recent drought conditions have most likely reduced the vigor of remaining graminoids, leaving large amounts of bare ground with little competition of native plants. There is a risk in areas of high and moderate burn severity for the establishment of noxious weeds as many noxious weeds reproduce vegetatively, with deep root systems somewhat resistant to fire. Weed seeds may be present in the soil profile, and without competition from native grasses, can establish quickly. Cheat grass is known to occur on other areas of the District and may be one noxious weed present in the soil profile.

Fisheries and Aquatics

Wildcat Canyon is an intermittent stream in the vicinity of the fire and is dry much of the year. There are no perennial pools in its lower reaches near the fire. No immediate impact on fisheries is expected in the stream. Chevelon Creek receives the flow of Wildcat Canyon approximately 6 miles downstream of the Potato fire. The northern portion of the burn also drains to Chevelon Creek via an unnamed tributary which reaches the confluence about 4 miles below the fire. These reaches of Chevelon Creek have perennial pools which support populations of native and non-native fish. Native species found in a survey by the Arizona Game and Fish Department in 1996 included speckled dace (*Rhynichthys osculus*), Little Colorado sucker (*Catostomus sp. 3*), roundtail chub (Gila robusta), and bluehead sucker (*Catostomus discobolus*). Non-native species found in this survey included golden shiner (*Notemigonus crysoleucas*), fathead minnow(*Pimephales sp.*), and brown trout (*Salmo trutta*). These isolated populations may be impacted by sediment and ash from the Potato fire.

Chevelon Creek is one of only 4 streams where the endangered Little Colorado spinedace *(Lepidomeda vittata)* are currently found. This species is in danger of extirpation. The remaining population in Chevelon Creek can be found in perennial pools located approximately 21 to 23 miles below the Potato fire. It is unlikely that ash flows and sediment generated on the Potato fire will have a measurable impact on this population.

However, it is a Forest management objective to minimize sediment input to the Chevelon Creek system to aid in recovery of the species. Chevelon Creek was not significantly effected by the Rodeo-Chediski fire of 2002 but is downstream of the Sand fire which burned earlier this year adjacent to the West Fork of Chevelon Creek.

Wildlife

The principal concern posed by the Potato fire to wildlife is related to Mexican spotted owls possibly occupying the Oxbow and Grapevine Protected Activity Centers PACS on the southwestern perimeter of the burned area. It is possible that the presence of human beings and noise generated by fire suppression activities may have had a temporary negative impact on the nesting and roosting activities for these birds and may have temporarily disrupted foraging opportunties and foraging time. The PACs themselves sustained little direct damage from the fire. Foraging opportunities may actually improve in the moderately and severely burned areas adjacent to the PACs if adequate ground cover can be established there to stimulate an improved prey base. Any aerial operations associated with proposed BAER stabilization activities can have similar disturbance to nesting, roosting and foraging as the fire suppression activities and need to be adjusted to control these

Cultural Resources

The Potato Fire is located within a mixed pinyon-juniper and Ponderosa Pine woodland environment which typically yields high cultural resource site densities. Although 1,700 acres of formal archaeological survey had been previously performed within the Potato Fire affected area, little was known about archaeological site densities within and surrounding the Wildcat Canyon area. Accordingly, an aerial heritage resource survey was warranted within the moderate to high severity burn areas in order to identify National Register Eligible cultural resources within the burn that would potentially be in need of stabilization treatment. An aerial survey for large, highly visible sites was conducted by archaeologists Jeremy Haines, Lindsey Smith and Jeanne Schofer on the morning of June 17, 2006. Flight time was approximately one hour and covered all areas of moderate to high severity burn. No new sites were found to be eligible for BAER rehabilitation or stabilization during the survey. In addition, following aerial reconnaissance, several localities of high site probability were further inspected during pedestrian survey. Ground inspection determined that all twenty-six sites located during Potato Fire suppression activities are on level ground and are not threatened by fire related wind or water erosion nor are there remaining burnt tree stumps or stump holes that pose a hazard to the structural integrity of the sites.

Special Management Area

A portion (200 acres) of the Wildcat Research Natural Area falls within the Potato Fire Area (see map). The purpose of this area is to protect natural ecosystems for research purposes. No treatment is scheduled within this area with the purpose to observe natural recovery rates of different soil burn intensities. This area can be used as a baseline for BAER treatment effectiveness.

B. Emergency Treatment Objectives:

1. Minimize hillslope and wind soil erosion to protect long-term soil productivity.
2. Prevent establishment of noxious weeds by providing competitive ground cover.
3. Prevent short-term increases in sediment transport to occupied habitat of the endangered Little Colorado spinedace.
4. Prevent damaging floods and sediment inputs to the ephemeral drainages crossing the Potato fire.
5. Protect bridges from potential flood/debris damage.

C. Probability of Completing Treatment Prior to Damaging Storm or Event:

Land **80** % Channel **90** % Roads/Trails ___ % Protection/Safety ___ %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	75	75	75
Channel	90	90	90
Roads/Trails			
Protection/Safety			

E. Cost of No-Action (Including Loss): **$3,700,000**

F. Cost of Selected Alternative (Including Loss): **$3,180,000**

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Chris Nelson - ASNFs

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H. **Treatment Narrative:**

Land Treatments: Aerial Seeding

Objective: Increase infiltration rates, reduce short and long term wind and water erosion potential, and prevent establishment of noxious weeds by promoting the establishment of vegetative cover of native perennial grass species in burned areas. Winter wheat, included in the mix, should provide a quick cover of annual grass to partially protect against the first year monsoon season storm damage.

Method: 3,265 acres of severe burned areas in the Potato fire will be treated by aerial seeding with fixed wing aircraft. The seed mix for soil group 3 and 4 (465 acres) will include Mountain brome *(Bromus marginatus),* Slender Wheat *(Elymus trachycaulus),* Western Wheatgrass *(Pascopyrum smithii)*, sand dropseed (Sporobolis cryptandras) (all native perennials) and winter wheat (*Triticum aestivum*) (an annual). The seed mix will be obtained at considerable cost savings from excess supplies from the Rodeo-Chedeski fire of the White Mountain Apache Tribe. Seeding rate is 25 seeds/square foot, at 26.5 lbs/pls/acre.

Due to the extreme wind erosion conditions that are occurring in soil group 1 and 2, seeding of a cereal wheat cover crop is recommended to add surface roughness and to improve perennial plant microhabitat. This area of approximately 2200 acres will receive a mix of 7.5 seeds/square foot of winter wheat (*Triticum aestivum*), western wheatgrass (*Pascopyrum smithii*), sideoats grama (*Bouteloua curtipendula*), and 2.5 seeds/square foot of sand dropseed (*Sporobolis cryptandras*) during the summer monsoon rains to ensure optimum germination conditions. Three species are adapted to sandy soil surface textures and low soil moisture conditions, one is adapted to heavier soils that occur more frequently in the southern

portion of the fire area. Cattle grazing should be deferred within the burn for at least 2 years to allow for recovery. District restocking guidelines should be used to determine if recovery objectives have been met.

Ground mulching

Objective: Reduce hydrophobicity, increase infiltration rates, reduce short term erosion potential on an economical basis by ground application of mulch to approximately 30% of the seeded areas.

Method:

560 acres of severe burned of the more erodable hillslope areas above internal drainages within the Potato Fire will be treated with application of certified weed free chopped wheat straw at a 1 ton/acre rate using using contracted straw blowers and crews. Consistent application of mulch will be assured by re-distributing straw by hand with field crews if necessary. The remainder of approximately 830 acres will be strip mulched purpendicular to prevailing winds or to the contour on steeper slopes to help add surface roughness. Strips will be approximately 75 feet wide, or the width a straw blower can effectively cover, with a 75 foot untreated strip between. Strip mulching will be monitored for effectiveness over the next two years.

Channel Treatments:

Objective: Reduce risk of bridge damage or loss from scour and potential debris jam at FR504 and Daze Canyon.

Method: Remove existing pine and juniper species from under and in close proximity upstream of bridge to allow for free flow conditions preventing potential debris jam.

Vegetation under Daze Canyon Bridge

Roads and Trail Treatments:

None needed.

Protection/Safety Treatments:

None needed.

I. **Monitoring Narrative:**

Aerial seeding application: Achievement of intended application rates will be monitored using 1 sq. ft. adhesive tiles. Cost is included in application estimates.

Erosion control: 5 photo point monitoring sites will be established within burned areas – 1 wiithin the Wildcat RNA (see map) where no treatment is prescribed, 1 within a seeded and mulched treatments area, one in the northern area where cover crop is prescribed, one in a strip mulched area, and 1 within a seeded only treatment area in the southern portion associated with ponderosa pine. Photos will be taken before, immediately after and within one year of completion of the land treatment measures. Monitoring of the photo points may be extended for up to 2 additional years if the first year's monitoring reveals the need for further treatments.
Vegetative recovery will also be evaluated to determine the need for further treatments by walk through evaluations.

Noxious weed prevention: An annual inspection of the burned areas to evaluate the effectiveness of measures taken to prevent establisment of noxious weeds will be performed after the summer monsoon season in the initial year of treatment and for up to two more years thereafter.

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

			NFS Lands				Other Lands			All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
Aerial Seeding S	Acres	50	465	$23,250	$0		$0		$0	$23,250
Straw Mulch Ground	Acres	325	560	$182,000	$0		$0		$0	$182,000
Aerial Seeding N	Acres	70	2200	$154,000	$0		$0		$0	$154,000
Straw Mulch Strip	Acres	163	830	$135,290	$0		$0		$0	$135,290
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$494,540	$0		$0		$0	$494,540
B. Channel Treatments										
Channel Clearing	Acre	1000	1	$1,000	$0		$0		$0	$1,000
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$1,000	$0		$0		$0	$1,000
C. Road and Trails										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$0	$0		$0		$0	$0
D. Protection/Safety										
				$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	member									
	days	300	20	---	$6,000		$0		$0	$6,000
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				---	$6,000		$0		$0	$6,000
F. Monitoring										
Photo/Noxious Weed	Plan	2000	1	$2,000	$0		$0		$0	$2,000
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$2,000	$0		$0		$0	$2,000
G. Totals				$497,540	$6,000		**$0**		**$0**	**$503,540**
Previously approved										
Total for this request				**$497,540**						

PART VII - APPROVALS

1. */s/ Deb Bumpus* *6/28/06*
   (for) Forest Supervisor Date

2. */s/ Lucia M. Turner (for)* 6/30/06
   Regional Forester (signature) Date